

# COMPUTERWORLD

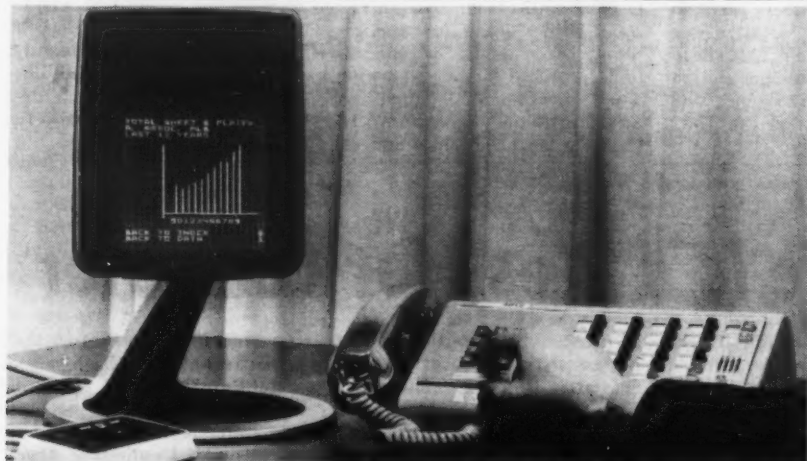
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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By pressing the proper "password" buttons, a user of the Picturephone service receives information stored in a computer at the Pittsburgh headquarters.

## But CRTs Are Cheaper

## Bell TV Displays 360 Data

By Ronald A. Frank  
CW Technical News Editor

PITTSBURGH, Pa. — AT&T's Picturephone is being used to display data from a CPU, but it is an expensive substitute for a CRT terminal.

This is the preliminary finding of the Aluminum Co. of America (Alcoa) which is using desk-top Picturephone units to access portions of its 360/65 data base.

Using in-house developed software, the Alcoa Picturephone Remote Information System (Apris) allows certain executives to access the computer center and call for management information to be displayed in a "page" format.

Described as the first commercial user to integrate the Picturephone with data processing, (Westinghouse had an earlier test site) the Apris system would not be cost effective without the need for the primary video capability, according to Michael Coleman, the firm's coordinator of computer science services.

The Picturephone access system is not cheap. Based on Pennsylvania Bell tariffs (the first in the country), Alcoa pays almost \$1,600/mo for its equipment and lines.

This includes one IBM 2701 Line Adapter, two Bell 305 Data Display Sets, one Picturephone intercom circuit, three Picturephone units, two Picturephone service lines and one key service control unit.

When an executive wants to access data, he enters a numeric "password" on his Touch-Tone telephone. To display a specific page of data he enters #page num-

ber)#. To graph numeric data being displayed on the Picturephone unit, he presses \*1\*.

An executive can only access pages cleared to his password, and the system is still essentially a computer output med-

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## User Wins Over \$1 Million In Contract Suit Against WU

By a CW Staff Writer

NEW YORK — A computer service bureau customer has won over \$1 million in damages, as a result of the bureau's failure to perform its contracted obligations.

The winner of the judgment, Law Research Service Inc. (LRS), said it probably represented the largest amount ever awarded as a result of a company's failure to deliver computer services.

Western Union Telegraph Co. (WU) sold the computer services to LRS to build a data base of legal decisions which lawyers could search to find precedents in their pending court cases.

A 1968 suit charged WU had failed to add new cases to the data base, preventing LRS from having up-to-date files. Last week's decision by the New York State Appellate Court upheld earlier recommendations [CW, Jan. 21, 1970] that the service bureau be penalized for breach of contract.

The actual damages awarded to LRS were \$1,064,552; the customer was also "indemnified" from any claims of its own customers "arising from Western Union's

failures to deliver the computer services," according to LRS President Elias C. Hoppenfeld.

There are at least six pending cases in New York State, and 11 similar cases nationwide, all arising from this "failure to perform" the contracted services, Hoppenfeld related.

The undelivered services include adding the court decisions to the drum on WU's Univac 418, and providing billing tapes to LRS. The court also had already ruled that WU had "drastically" raised the fees it would charge for the computer searches.

Under the appellate court's ruling, WU will assume responsibility for \$2.6 million in unfulfilled franchises which LRS could not service properly, Hoppenfeld reported.

While LRS' original plans were to find another computerized service company to maintain its data base, the company decided to build and maintain its own instead, the president revealed. Lawyers now use computer terminals to communicate with the specially designed LRS facility.

## City DPers Seek Power Crisis Funds

By Edward J. Bride  
CW Staff Writer

NEW YORK — The "owner" of one of the city's largest computer collections — the city government — may be forced to spend millions of dollars to protect its expensive equipment from power failures and reductions.

Repeated "brownouts" and perhaps blackouts are expected to plague the nation for years to come, according to local and federal power experts, who advise users to take precautionary measures.

Carmin G. Novis, chairman of the city's Emergency Control Board, said voltage regulators are needed to avoid fluctuations, and some type of auxiliary power units are needed for any computer center whose operation was considered "critical."

He listed the police department's Sprint dispatching system and the regular operations of the budget and finance departments as likely candidates for such equipment, provided the funds can be found.

Novis told CW the recent power fluctuations had caused such problems as automatic emergency shut-downs and consequent loss of computer time. Future outages could cause inaccuracies in payrolls and tardiness in sending out tax bills, he related.

### No Loss of Data

The police department has not suffered any loss of data or other errors, according to a department official, but the system had been made unavailable for "various periods of time" because of fluctuations.

The official said that, while there was no permanent damage, the department's CRT terminal (an IBM 2915) will "go down" with a voltage reduction of more than 8%.

While Con Ed has announced power

reductions of only 8%, the company has admitted that, depending on a user's location in the power circuit, the actual reduction experienced could have been more. A surge in usage on that line could also result in a net reduction of more than the implemented or intended power cut.

### Inquiry Rate

The Sprint system handles an average daily inquiry rate of 10,000, a police lieutenant related. Emergency calls and dispatches are processed on the department's IBM 360/40; a citizen dials a "911" emergency telephone number for direct access to the terminal operator. Brief outages of the system have occurred

during fluctuations in both heat waves and cold spells, the police department official stated.

### Widespread Power Shortage

The Federal Power Commission said last winter that most sections of the country were in danger of continued power shortages in future summers, continuing a trend that began in 1969.

The commission said there was inadequate generating equipment installed at several electric utilities, not just in the largest cities, and that the only "adequate" power reserves were West of the Rocky Mountains.

(Continued on Page 4)

## David the Rate Payer Meets Goliath

CW West Coast Bureau

LOS ANGELES — A David and Goliath drama, computer age style, is taking place here. A DP consultant with a \$95/mo terminal in his home has challenged data submitted by Pacific Telephone Co. for a rate increase.

Donald Jameson walked into recent Public Utilities Commission hearings on the rate increase and plunked down 31 pages of data questionnaires and answers, 28 pages of data printout, 15 computerized graphs and four pages of summary, plus exhibits.

When asked how the commission reacted to his presentation, he said, "They were surprised at the packet I put in their laps."

Jameson estimates he has invested thousands of dollars in the investigation, but did it because "I'm a rate payer who doesn't like the rates I pay." Pacific is asking for a \$195

million rate increase which Jameson claims is "improper and unreasonable."

After his presentation some rate payers offered to cover any computer costs that might accrue when he prepares a brief. The commission responded to his appearance at the hearings by acknowledging that he made valid points and that "we need barbs like you."

Jameson's main attack was on Pacific's construction cost prediction which is expected to reach \$1 billion a year by 1975. He claimed its figures were out of line and asked, "Where is all this proposed construction money going to be going?"

Jameson specializes in the field of computer and biomedical instrumentation consulting. He uses a Model 33 Teletype terminal connected to a GE-265.

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# UN Study Recommends DP Aid for Underdeveloped

NEW YORK — A United Nations inquiry has called for the UN to set up an international advisory board to aid underdeveloped countries by setting up computer centers, training new staffs, providing technical assistance and establishing an EDP "Peace Corps" [CW, Feb. 17].

The results of the two-year study will come before the General Session of the UN Economic and Social Council, April 26 to May 21. At that time the UN will determine the support it will give to the study's recommendations.

At present there is only a "low-key" effort by the UN to supply needy countries with DP skills and know-how.

The study group's report, titled "Concerted Action for the Transfer of Computer Technology to Developing Countries Is of Top Priority," gives advice on the first steps for a developing country in bringing in a computer, suggestions for regional centers and "twinning." Twinning is the pairing up with a

developed university, government agency or industry center.

The report makes a strong case for supporting advancement of this technology to developing countries. It points out that perhaps the most important aspect of computers is that in the course of introducing them to carry out a task, people must reassess the whole way in which the task should be done. In fact computers often lead to re-evaluation of why the task is being done.

The report states that technology is not only the key to

reducing the disparities between the developing and the developed countries, but technological progress is essential. The world has come to recognize, that computers can be in themselves one of the principal instruments for the transfer of technology, it continues.

Speaking of the proposal that EDP-trained volunteers serve in underdeveloped areas, Australia's Dr. Benjamin Barg, head of the New Technologies section of the Office for Science and Technology, said of the U.S., "You undoubtedly have a tre-

mendous, enormous reservoir of computer technical skill in this country, ... but ... it will be of no ... [use] to developing countries unless they have readiness and ability to absorb this technology. There is also the pay scale problem."

A survey was made by the secretary general's office to determine where member countries are finding computer applications. In general, the applications covered the following areas: government planning and administration; collection of statistics on production and re-

sources; management of national industries; public health administration; preparation of economic indices; education and research; demographic tabulation, analysis and projection.

The work being done in the developing countries is following the path of that first taken by the developed countries. The report expresses hope that by bringing in expert computer skills the countries will not have to go step by step up the same ladder but can leapfrog into the present.

## 'Voice of the People'

# A Vote for Charlie Is a 'Yes' for Computer

NEWTON, Mass. — Another McCarthy has entered the political arena, this one claiming the computer will make him the true voice of the people.

Charles C. McCarthy, 30, announced his candidacy for the Senate seat now held by Edward Brooke (R-Mass.) on the sole issue of enabling every citizen to vote on every major issue, by using the telephone and a computer.

Under McCarthy's plan, each Senate bill would be voted during a specific time span, during which all recorded votes would be tabulated for or against the

measure. Each federally registered voter would be given a special number, to be used in conjunction with his Social Security identifier to access the computer.

The voter would then "dial" (or press Touch-Tone numbers) "001" for yes or "000" for no.

The computer would then delete that person's registration number from its inventory of franchised individuals, thus preventing double votes. The "inventory" would presumably be restored to completeness with each issue.

McCarthy admits to not being

a professional politician, but possesses strong educational credentials: B.A. in philosophy from Notre Dame, Masters in English education and theology from Notre Dame and a Ph.D. in law from Boston College. He was on the faculty of Notre Dame from 1968 to 1970, before returning to his native Massachusetts.

In announcing his candidacy, McCarthy promised to "always vote ... not according to my will, but strictly according to the will of the majority of the electorate" on each bill that reaches the Senate floor.

Commenting on representative government, McCarthy said there should be "at least one moment before a bill becomes law, when the people have an opportunity to directly decide whether they want to live under this proposed law — whether they want to pay for this proposed law."

The candidate is running as an independent, and will soon seek signatures to assure a place on the 1972 ballot. A spokesman implied the computer would be located in this state, rather than in Washington, in order to reduce communications problems.



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(Continued from Page 1)

ium, according to Coleman.

At present users cannot input material into the 360 but that capability may be added later, he said.

In addition to the Picturephone unit and 12-button Touch Tone phone, the Apris system includes a Bell 305 Data Display Set which converts digital characters from the CPU into video scan lines for display on the Picturephone unit.

In the other direction, the 305 converts analog signals from the

Touch-Tone phone into digital form for entry into the CPU. The 305 also handles the video refresh of the Picturephone unit and allows editing with the addition of an acoustically coupled keyboard.

The Alcoa Model 65 includes an IBM 2701 line adapter which transmits data to the Bell 305.

The Picturephone units can display 440 char/screen display or page. The Apris system is presently transmitting data from the CPU site to Alcoa's executive offices across the street using

Bell System lines. Transmission is in Ascii at 1,200 bit/sec, asynchronous mode.

The Apris configuration includes three Picturephone units (\$70/mo each), two 305 display sets (\$225/mo each) and one Bell key service control unit (\$12.50/mo).

The Bell line charges include \$9/mo for a basic business line plus \$110/mo for Picturephone service. This includes a half hour of usage, Coleman said. Additional time costs 25 cent/min.

In addition, a Picturephone intercom circuit is required to allow in-house users to communicate with each other.

A savings could be achieved by using a Bell 202 dataset and transmitting data over a narrow-band line instead of the more expensive wideband Picturephone line, Coleman said.

In this type of circuit, the 202 would receive the data and send it to a Bell 305 using a Picturephone intercom circuit, Coleman said.

A non-Picturephone configuration using IBM 2265 CRT Display Stations with 2845 controllers and Bell 202 datasets would cost about \$1212/mo or about \$400 less per month. A voice grade dial-up line would cost about \$7 to \$9/mo. Other CRT units are available at lower cost for a similar system.

The Apris system is useful only in conjunction with its video capability, Coleman said. Among the drawbacks of the display unit are its limited display capacity (compared to a CRT terminal) and the limitations of data that can be entered from the Touch-Tone keyboard.

## Two DP Programs Help Louisiana Solve Legislative Reapportionment

BATON ROUGE, La. — Legislative reapportionment here is being assisted by two computer programs which provide real-time configurations of districts and computation of population statistics.

The "Scratchpad" and "Lookup" programs are called up through video display terminals on the Univac 494 system at the state Computer Center.

The information base is the 1970 census population, according to programming manager T.P. Burkes, who noted the figures were broken down by parish (county) and ward. The base population data was then structured to reflect current configurations of each Senate, House and U.S. congressional district.

Up to four proposed reapportionment plans for each type district may be stored in the data base.

The Scratchpad program answers a legislator's "What

if ... ?" by calling up a current or planned district from the data base for arithmetic computations. Districts may have specific parishes or wards, or members, added or subtracted from them.

The resultant census population of the proposed district, as well as the numerical and percent deviations from the "ideal population," is then computed and displayed, Burkes explained.

The average response time is three seconds, he added.

The Lookup program supplements Scratchpad by simply displaying a district from the data base, plus the population figures for each ward and parish within the district.

### Computer to Route Buses

PENN YAN, N.Y. — The local school board of education has decided to prepare next year's school bus routines with the aid of a computer. The board is contracting Programmed Transportation Inc., for the job.

## Picturephone Displays Data in 'Page' Format

Alcoa is experimenting with a full keyboard as a more effective method to enter data into the system, he said.

At present, the Apris system can display only limited data from the 360, but the firm will later include its management information system data base.

At present, Picturephone service is limited to the Golden Triangle area of Pittsburgh.

A Bell spokesman told CW that about 40 Picturephone units are now operating at 10 user sites. None of these is accessing a computer like the Apris system,

ALUMINUM VANS		
LAST 12 YEARS		
1959	17129	
1960	20791	
1961	25475	
1962	23560	
1963	33921	
1964	34479	
1965	40823	
1966	52385	
1967	62884	
1968	48750	
1969	65248	
1970	86714	

User is given information to which he is entitled by his password.

WE ARE VERY SORRY,  
BUT YOU ENTERED AN  
INCORRECT PASSWORD  
THREE TIMES IN A ROW.  
TO PROTECT AGAINST A  
POSSIBLE SECURITY  
VIOLATION, WE MUST  
TERMINATE THIS CALL.  
PLEASE CALL ...  
553-2868  
FOR FURTHER INFORMATION.

If he fails three times in a row to give the proper password, the computer politely "turns him off."

## Tax Services

# New Battle Shaping Up: Manual vs. Computerized

By Michael Merritt  
CW Staff Writer

MENLO PARK, Calif. — As the midnight hour of April 15 relentlessly approaches, the American taxpayer may pause amid thoughts of hard-earned money suddenly vanished, and consider a computerized or non-computerized tax service.

Which to choose is a matter for some argument between the tax men.

For example, H&R Block, the country's largest franchised tax service, is still sticking with the adding machine. While the company has spent a good deal of money trying to computerize, it isn't satisfied with the results.

San Francisco's Benevest Income Tax, Inc., an offshoot of Beneficial Finance, gives EDP service to even the simplest return, however.

Block's complaints are several. The main problem it has had in tests, according to a company spokesman, is reliability. "The programs that exist don't cover all possibilities and they are not error-free," the representative said. "We are hesitant to

## But College Students Think They Have Found The Optimum Method

CHARLOTTESVILLE, Va. — Campus-community-corporate citizen action here recently yielded \$100,000 for more than 1,000 area residents and delighted the Internal Revenue Service.

Counseling by University of Virginia students on filling out tax forms coupled with computations resulted in thousands of refund dollars returned to taxpayers.

Moving digital information rapidly and accurately with the aid of high-speed communications teleprinters played a major role in the program's development.

Fast information transfer compacted hours into minutes of work to stretch the program to cover hundreds more people than could have been covered with a strictly manual system.

Equipped with a strong desire to "get involved" and some imagination, a pair of UVA Graduate Business School students put together a community self-help program that would tax the skills of any social architect.

The idea was to set up a number of free tax counseling sessions in various locations around the city to aid taxpayers in filling out the IRS forms and providing them with the guidance necessary to get the refunds to which they were legally entitled.

The IRS was responsive and the program was designated as a pilot and put into effect in the Charlottesville area. With the cooperation of the Charlottesville school system and community action groups, facilities were obtained where the counseling could be conducted.

Over six weekends a brigade of 165 students stationed in seven locations around Charlottesville answered questions and advised more than 1,000 people. Newspapers, local service clubs, radio and television stations helped out by publicizing the counseling sessions well in advance.

To process tax computations rapidly and serve more people, the students designed a computer program long before the counseling sessions became a reality. They contacted GE's Communication Systems Division plant in Waynesboro and arranged to obtain a high-speed Terminus 300 teleprinter. At the same time, they received the time-sharing computing time for the tax program by United Computer Services, a time-sharing organization based in Kansas City.

For its part the IRS donated flyers and posters for distribution,

jump when the programs are not completely proved."

Block also claimed that computers make the returns more costly to process.

### Questioning the Key

Preparing a tax return depends on a line of questioning, according to Block, where discovering a deduction for hospitalization, for example, may point the way to a deduction for ambulance fees that the client had not been aware of. "The process must have an intermediary — the computer is only as good as its input," said the Block spokesman.

Another Block complaint was that there are no programs that cover all possibilities, including all state and city tax returns.

Benevest Income Tax, Inc. sees a great future for the computer in tax preparation, both because the assurance of com-

putational accuracy enables its consultants to spend more time with clients, and because — with some new legislation and some help from the IRS — tax company computers communicating directly with IRS computers can eliminate costly paperwork and the possibility of error.

In the Benevest system the tax consultant prepares an input sheet which is transcribed on a key-to-tape unit, and verified twice. The data on the cassettes is then transmitted to a processing center which performs the calculations and prepares a tape for off-line printing.

### Turnaround Time

The forms are then prepared and returned to the local offices for presentation to the client. The process typically takes four to five days, largely because of the amount of physical transportation of forms. As the tax deadline approaches,

however, the turnaround time has been under 48 hours.

According to Benevest President Robert G. Miller, the main advantage of computerization now is the opportunity for the local consultant to do a better job for his clients. EDP takes the burden of the actual computation off the consultant's shoulders and leaves him free to explore the customer's tax situation.

"The people are the tax experts; the computer is just backup," Miller said. "The accuracy of the calculations is also highly important. The IRS is encouraging computerized returns because a large number of returns — I think their figure is 8% — contain simple calculation errors."

While Miller admitted that using the computer now costs more than doing the returns manually, he said that in sufficiently high volume the difference is marginal.

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## Selective Service Data Bank to Keep Local Boards Efficient, Fight 'Dodgers'

By Joseph Hanlon

CW Staff Writer

WASHINGTON, D.C. — The Selective Service System will use a computer data bank to fight draft dodgers, and keep local draft boards operating efficiently.

Local draft boards face much criticism today because of alleged inefficiency. Growing numbers of men who do not want to fight in Southeast Asia have been able to exploit draft board errors to defer or prevent their induction.

"Kids are pretty smart nowadays. They can get the boards into a pretty big mess," declared one Selective Service System (SSS) spokesman.

The SSS spokesman also noted that such a data bank could make it much easier to reconstruct files that were destroyed by antiwar protestors.

### Draft-Eligible Men

The data bank will contain information on all draft-eligible men in the U.S., and should begin operation late this year. Curtis W. Tarr, director of the SSS, said: "I expect our initial

efforts will be confined to bare facts and vital statistics which identify the registrants (e.g. name, address, Selective Service number, birthdate, random sequence number and classification)." What additional information will be filed later is undecided, he said.

The system will contain a me-

will be sent to the computer center, he said, read by OCR and automatically entered into the computer.

### Scheduling Aid

The computer, in turn, will serve as a scheduling aid for the local boards, sending them lists

## Draft Board Policy Hit

WASHINGTON, D.C. — Sen. Sam J. Ervin (D-N.C.) has charged that some employers require prospective employees to authorize release of draft board file data as a condition of employment. The Selective Service System will release information from the files, if the draft registrant authorizes it, Ervin said.

Further, Ervin said that his Constitutional Rights Subcommittee has received reports that local draft board files contain irrelevant, false and damaging material, and that in many cases, the boards make no attempt to check on the accuracy of information.

dium-size third generation computer, two multiple line OCR units and data communications systems to tie the computer to six regional centers, according to the SSS.

Maj. Ron Schmiedekamp, chief of the SSS computer center, said the main purpose of the computer was to "keep local boards on the stick." One copy of all local board actions (such as classifications, notices to report for physicals, and actual inductions)

of actions that they are supposed to take (such as scheduling physical examinations). The computer will "keep local boards in line" by notifying the state SSS director automatically if a local board has not taken action within the required time.

In addition, the computer will provide the local boards with lists, such as everyone in the area with a particular random sequence number as drawn in the lottery.

## Funds Sought to Protect N.Y. DP From Brownouts

(Continued from Page 1)

This report, plus repeated regional brownouts and one blackout in New York, prompted the Emergency Control Board to recommend priority treatment for major users of electric power especially in urban areas.

Con Ed has stated that the suburbs would indeed be the first areas to lose power, if the "special treatment" step is ever necessary, and that businesses would be among "the last to go." The problems stem from the brownouts, however, and not the pre-announced blackouts.

Novis said he would therefore support any agency's request for "voltage buffers" to avoid the fluctuations, but that each agency would have to come up with its own funds for these units by slashing expenditures elsewhere.

IBM meanwhile reiterated previous statements that voltage reductions of 8% should not cause problems in its computer equipment, but was unaware that such reductions had taken place (at least three times in New York). A spokesman said IBM equipment should function properly, assuming the 8% reductions occurred from "nominal" parameters of 208-230 V.

The official indicated most IBM equipment now has detection devices to automatically cycle down the computers and protect program logic. Problems would occur in skipping bits of data being processed, necessi-

tating restarting some jobs, the spokesman noted.

### Cutbacks at "Super Agency"

At the city's Finance Administration, which one city official described as the "super agency" which dispenses money, the DP center has been asked to shut down one of its two computers to conserve electricity during emergency situations.

The agency uses an IBM 360/30 and a 360/40. A spokesman said when requests for curtailment do occur, "we can just hope the reduction will be no more than announced," so other processing can continue.

John McGann, assistant finance administrator, wants a standby generator for his DP operation, since relying on the service of the power company "puts our operation in jeopardy."

The Finance Administration has had data losses occur, with the need to recreate costing "hours of processing time," McGann disclosed.

### Failure in Parity Checks

Officials at the Budget Bureau were discussing various emergency power measures when contacted by CW last week, but denied any serious problems except for some failures in parity checks.

An official said "slight variations" do not present problems, but that some type of voltage control equipment is needed to avoid serious fluctuations.

## News Wrapup

### '3d Party' ID Aided Program Theft

OAKLAND, Calif. — An innocent third party may have been involved in the civil/criminal court action between an employee of University Computing Co. and its competitor, Information Systems Design Corp.

According to an Associated Press story last week, Shell Development Co. used the computer services of both the utilities, which "as a convenience to Shell . . . assigned Shell the same site identification number."

Court papers filed by ISD charged that UCC programmer Jeffrey Ward therefore had easy access to the Shell user number, which in turn gave him access to ISD's computer, a Univac 1108.

Ward has been charged with grand theft in criminal court, and has been named in a \$6 million civil damage suit, arising from alleged theft of "proprietary" plotting programs from ISD's drum, in an attempt to win over a major ISD customer, the suit charged.

### School District Has Problems With Payroll

RIVERSIDE, Calif. — An employee used the wrong tax table and as a result 9,000 paychecks for the Riverside County School district were computer-processed and mailed out with the wrong amounts on them. Some were off only \$10 or \$30. Others were paid as much as \$250 in excess. The mixup was cleared up with a "tremendous amount of overtime," according to Brooks Coleman, assistant superintendent for business of Riverside County schools.

Those who were short-changed were sent supplemental checks and those receiving too much were given the option of refunding the excess or having it deducted from their next checks.

A new deck had been prepared for the withholding tax, but instead of using this one to compute the payroll, the employee used an old one.

### DP School Closing Prompts Investigation

SAN JOSE, Calif. — The state is investigating the abrupt closure of a computer school here without notice to students or instructors.

Computer Institute, Inc. had 63 students paying up to \$2,000 each for their instruction. Frank H. Leavitt, field representative of the Bureau of School Approvals, state Department of Education, said a representative of Quintex Corp., presumably the parent firm of the school, had "taken the records from the school and left."

### State to Switch DP Control to Private Firm

JEFFERSON CITY, Mo. — Lt. Gov. William E. Morris has announced that the state's huge computer system in the Department of Revenue would be removed from the supervision of patronage workers and put under a contract with professional DP experts.

"Within a year from now," he said, "the plan should resolve what has been the greatest single source of citizen complaints about state government."

In the last two years, numerous scandals in the operation of the state's DP unit have been aired in public. There have been numerous complaints over the processing of car titles and license registrations and a huge backlog of income tax returns and refunds.

### Sherman Mills Fairchild, IBM Heir, Dies at 74

NEW YORK — Sherman Mills Fairchild, chairman of Fairchild Camera Equipment and Fairchild Hiller Corp. and a director of IBM, died last week at the age of 74 in Roosevelt Hospital here. He was reputed to be IBM's biggest single stock holder. His father, George W. Fairchild, a founder and first president of IBM, left him stock worth \$2 million after taxes.

### Hoosiers Line Up for 'Instant' Licenses

INDIANAPOLIS, Ind. — A computer hookup with the Bureau of Motor Vehicles headquarters allows a permanent license to be generated in less than three minutes.

The system has been given a trial run in which no temporary license is issued at all. Officials hope that the new system will eliminate chances for mistakes in typing and mailing.

Bureau officials expect at least one computerized branch will be open shortly in every district in the state and that by mid-May every branch in the state will be offering "instant licenses."

### ZPG Has Abortion Information Data Bank

LOS ALTOS, Calif. — Many applications have been found for computers to help solve the problems of mankind.

Now there's one for women seeking abortions. Zero Population Growth, a nonprofit organization headquartered here, has compiled an Abortion Information Data Bank (Aid Bank) with 500 listings, including 300 doctors, which is stored on a time-sharing computer. Other data includes hospitals and costs of abortions around the country.

### Jobless Computer Engineer May Be Suicide

SAN FRANCISCO — A computer engineer who had been unemployed for several months is apparently a suicide victim.

The body of Charles Olcott Mallinckrodt Jr., 35, was found here beneath a tree with a plastic bag over his head and his resume, job applications and rejections nearby.

The chief deputy coroner said a glass bottle, still containing some liquid, was also found near the body. Its contents have yet to be analyzed. The victim's resume showed that he had owned his own business in 1969 and 1970.

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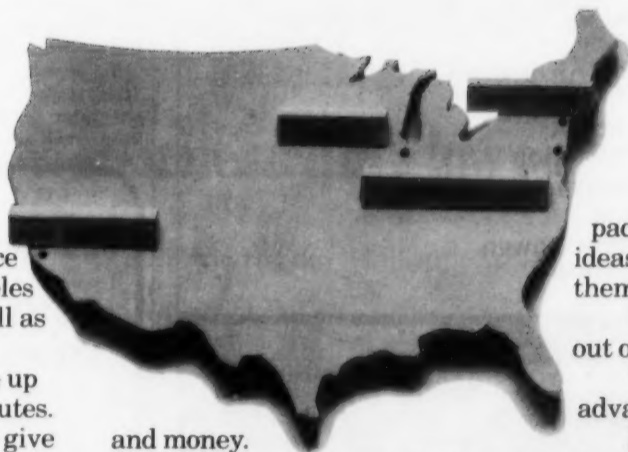
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## University Scribes Keep on Top of News

BRIDGEPORT, Conn. — Long on news and short on depth, most college papers, particularly the smaller ones, concentrate on spot coverage. Such papers usually do not have the time to dig out earlier, related stories. But reporters on the "Scribe," the University of Bridgeport's semiweekly newspaper, have brought depth to their stories without time-consuming digging through back issues and files of clippings.

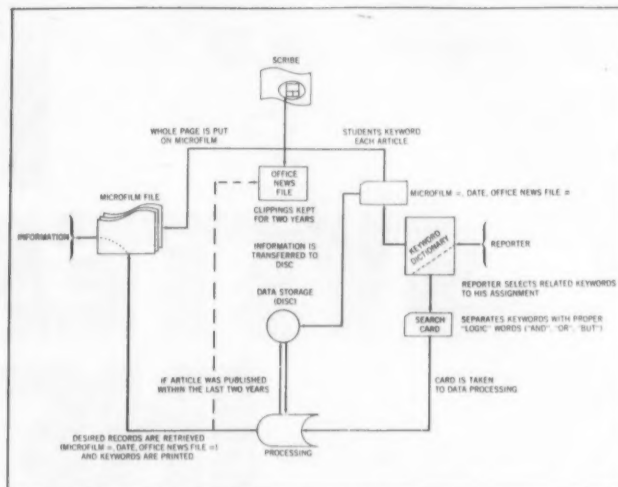
On the "Scribe," the search for background is a matter of course. In fact, it's a requirement, the byproduct of a news/data retrieval system in which article references are stored in the file of an NCR Century 200 computer and promptly made available in print after a dialogue with the system.

The user types out "key words" or descriptions which define the news stories he seeks. The key words are connected by "and," "or," or "but not" in order to set the limits of the search.

A reporter, who in the past might have averaged three hours a week in researching a story, now can dig up the facts faster, besides improving coverage. The logic of the search pattern itself disciplines college newspaper reporters to think in terms of relationships between one story and another, to find links between people and events, or to set limits on what the reporter needs.

The news/data retrieval system was conceived by Dr. Howard Boone Jacobson, chairman of the journalism department, as a means of reducing the stockpile of papers in the "Scribe's" library. Originally, five years of clippings were filed alphabetically by subject matter, and all earlier issues were microfilmed without any coding.

Presently, the files are arranged by subject matter, coded numerically and the matchups from a reporter's query are made automatically by the computer. The computer now directs the reporter to the precise issue of the



"Scribe" Data Retrieval System

"Scribe" on microfilm. The clip files cover only two years, thereby further reducing the loose paper in storage.

Only "hard" news and features are catalogued. Separate codes cover editorials and letters to the editor. Excluded are most sports stories, news on other campuses, advertisements, meeting announcements, pictures, poetry

and fiction by students and syndicated services such as columns and comics.

All news library files fit into a master subject classification, each with a two-digit code ranging from 01 (administration organizational policies) to 99 (university seal).

A second two digits classify the story line.

## Fire Control System Due To Enter Computer Age

LOS ANGELES — Fire chiefs of the future may fight large-scale fires with large-scale computers.

To support his belief that engineering can solve some of the world's social problems, Dr. Ken Kato devoted his doctoral research at the University of Southern California School of Engineering to developing the theoretical foundation for the establishment of a computerized fire control system.

"In essence," explained Kato, "the system will consist of a computer simulation model to keep track of hundreds of data

inputs and process this information to determine the most efficient way to use the available fire control forces — equipment and personnel — in the various regions of the total fire area."

Once such a computerized system were set up, it would provide the fire chief with up-to-the-second information on the hundreds of factors that must be considered and to decide how best to fight a fire.

The computer complex making up the heart of the fire control system would consist of a data bank, central data processor and data display unit.

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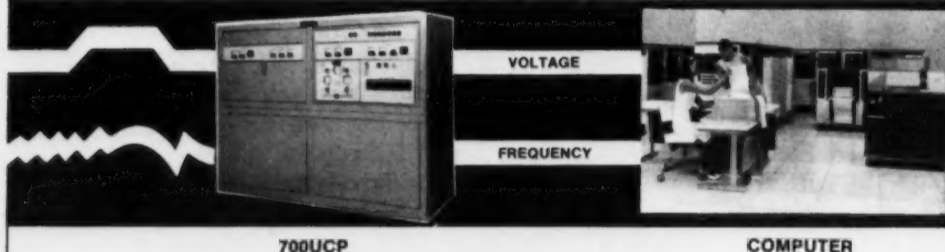
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# Marriages Mean 'Mismatches' in Dating Business

By Edward J. Bride  
CW Staff Writer

NEW YORK — "Have we got a girl for you?"

The president of the computer-dating company was jesting, for the reporter was happily married, but that remark was typical of the attitudes that made Operation Match a success.

Operation Match boasts "millions of matches" and over 235,000 marriages in its six-year history; only it doesn't "boast" of the marriages.

"When a couple gets married," President Stephen Milgrim complained, "we lose two customers," and two prospects for a singles-only ocean cruise. The 43-year-old entrepreneur of the machine-made match also runs what he calls the "only legitimate for-singles-only cruise that

there is."

"We don't look at a marriage as a victory, for that reason," he noted.

The matches are "suggested" by Fortran programs run on IBM

*Recently the computer-dating industry has come under legislative criticism because of false advertising or promises. CW interviewed the president of such a firm to try to shed some light on the inner workings of a successful operation.*

360/65s at either a Datatab or Leasco service facility.

To keep abreast of the times, questionnaires are periodically updated by using sociological data, and through consultation with independent psychologists.

The computer dating business

is "vastly rewarding," stated Milgrim, a systems analyst, adding Operation Match does not charge the hundreds-of-dollars fees common to other such services. Twenty dollars for "two to five" matches a month is the fee for one year, and it guarantees nothing more.

There are no promises of meeting the perfect mate, just of not meeting the people one would refuse to date, and of meeting 24 to 60 dateable people during the year.

While people worry that technology prevents people from "establishing meaningful relationships," Milgrim feels he uses the same resources to bring people together.

The questionnaires are "planted" with questions that might weed out married applicants,

Milgrim claimed, although he would not disclose any of those questions. "We've been fooled almost never," he asserted.

He said 99% of the "few" mismatches were due to key-punch errors, and added the other percent comes from the client: "Like under 'sex' they

may put 'occasionally.' Stuff like that."

The mismatches are "disproportionately blown up like hell," the executive stressed, adding he has pushed for legislation to eliminate fly-by-night dating services which have been known to exaggerate their successes.

## 360/50 (512K)

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Reply

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## Patent Issuance Threatened Because Of 'Hidden' DP Costs

By Alan Drattell

CW Washington Bureau

WASHINGTON, D.C. — The Government Printing Office has said that the Patent Office did not allow for increased costs when it switched over to computerized printing of patents recently. As a result, the Patent Office is now asking Congress for a supplemental appropriation of \$2,260,000 to prevent the suspension of patent issuance for 12 weeks later this spring and summer.

An official at the Patent Office said: "Our theory was that we would print at no greater cost using the computerized system than we did the old way."

The GPO explained that it had to raise the price it charges the Patent Office for printing its patents because of two significant factors:

- Federal employees were given a wage hike.
- The changeover to the computerized system by the Patent Office.

"You know you don't try a new method without it costing more money at least at first," said a GPO official. He added that in the long run the computerized method will lead to considerable cuts in cost in printing patents.

Under the new system, the Patent Office has its supplier, International Computer Print Corp., Ft. Washington, Pa., prepare magnetic tapes containing the patents. The tape is sent to GPO where a pass is made through the IBM 360/50 which uses a typography program. Output is a new mag tape which becomes the driver tape for the linotron machine whose output is fully typeset pages of patents.

## Punched Card Voting Still Has Support in Michigan

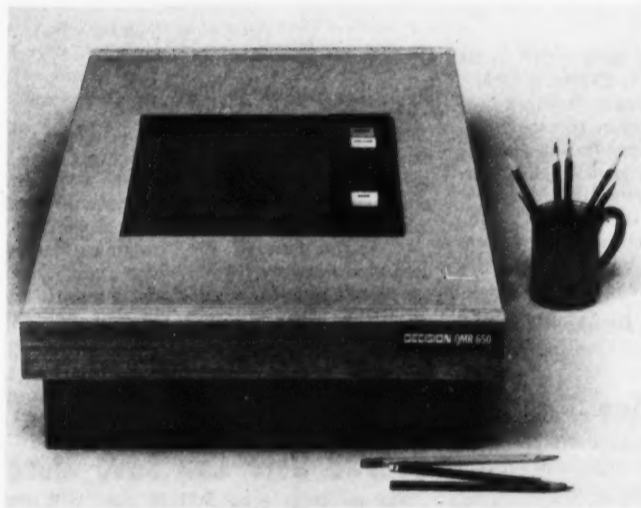
FLINT, Mich. — A bill which would prohibit the use of all computer punched card voting machines throughout Michigan has met with stiff opposition from the House Elections Committee.

The committee's own chairman, Rep. Alfred A. Sheridan (D-Taylor), is sponsoring the bill. The position was taken despite overwhelming evidence that the greatest part of the confusion was caused by errors and failures having little or nothing to do with the use of computers.

## Amazon Workers Paid by DP

RIO DE JANEIRO — Computers are useful devices, the Indians and other workers on the 3,000-mile Trans-Amazon Highway agree. The workers will receive their paychecks from a computer brought into the jungle especially for that purpose.

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## Editorial

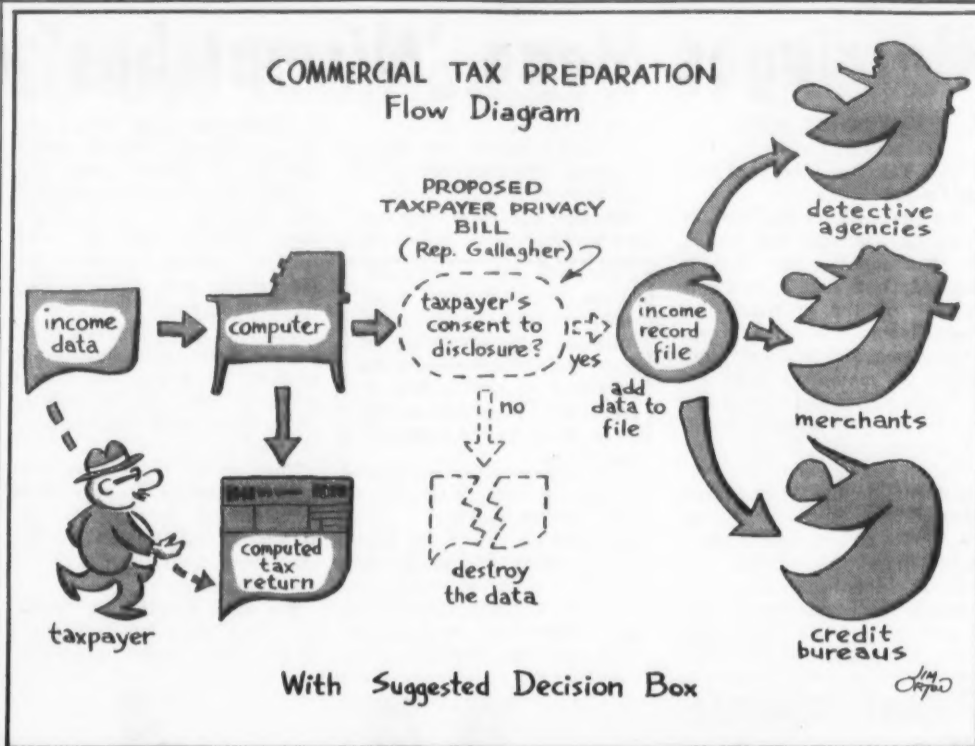
### Accentuate the Positive

There are no federal laws to prohibit tax preparation agencies from selling personal information to credit bureaus and other interested parties.

Rep. Cornelius E. Gallagher (D-N.J.) has introduced a bill to make such disclosures illegal without the consent of the person who supplied the data.

But this is a negative approach to the problem. Privacy Rule 1 is to prevent the accumulation of personal data when there is no real need.

The law should require that all records be destroyed or returned to the client after the tax returns are prepared. Where, to protect its legal position, the agency needs assurance the client can't later tamper with the records, the records should be turned over to a third party, such as a bank. The records then could be opened only in the presence of legal representatives of both the agency and the client.



## Letters to the Editor

### DPMA Demonstrates Courage

Hopefully it is not too late for me to speak out in support of DPMA's programs for the CDP and the RBPE.

An organization as large, as progressive in its thinking, and as courageous in its actions as DPMA will have vulnerable areas simply because one sailing into uncharted seas cannot foresee everything. Exposures of these areas can be constructive if they are weighted objectively against the accomplishments of which they are byproducts.

DPMA has demonstrated the capacity and courage to accomplish in its certification programs what others could not. To me, a nonmember, this deserves the tribute of the entire industry.

Winston Brooke, CPA, CDP

Anniston, Ala.

### Take the Test and See

Thank you for setting the record straight about IBM's 1st generation off-line print/punch capability [CW, March 24].

Although it was possible to hang any practical number of readers, printers, and punches on-line with an IBM 705, the reasons most users voluntarily chose the off-line alternative are legion: core limitation (40K maximum; incompatibility of peripheral equipment to mainframe/magnetic tape speed; no interrupt capability — a 705 could produce enough tape image reports in one shift to keep three off-line printers busy two to three shifts; meeting deadlines — reports could be printed while the 705 underwent scheduled or emergency maintenance; spreading the risk — on-line devices are all "down" when the mainframe is "down"; and finally the sheer economics of driving three printers with a \$45,000/mo prime shift rental machine.

Indeed, under first generation realities (and to a large extent second generation, too) was there any other "way to go?"

Sid O. Glover

Portland, Texas

P.S. Before first generation ended I graduated to software development, feasibility studies and equipment justifications.

### Off-Line Was 'Way to Go'

While I agree with much of what John Seitz [CW, March 17] says with respect to the CDP, I find it interesting that he would regard the holder of a CDP "with suspicion. . ." In his mind, apparently the CDP is a negative credential indicating that its holder is somehow less competent than the nonholder. I have never been a member of the DPMA, but I do hold a CDP (1968).

I would suggest to Seitz (as Robert Patrick suggested in *Datamation* several years ago) that his (even valid) criticisms of the certification program would be better received if he had taken the test

himself. Even if he fails, he would still have more information than he now has on which to base his judgments.

Kenneth W. Garrison

Palo Alto, Calif.

### Professional Problem

I question John Davenport's statement, "Paying overtime is something which can be done about our rotten software" [CW, Feb. 24]. The real problem is that one does not acquire professionalism by the mere exercising of a profession.

As to the worth of "programs tested and debugged between 5 p.m. and 8 a.m.," Davenport can speak best for himself and his staff; my own experience does not bear him out, and I'll even throw in weekends.

J.A. Tauber

Senior Member Technical Staff

Sunnyvale, Calif.

### 360/30 User Can Save More

Why not help your 360/30 user [CW, Feb. 24] cut his cost even further by saving him an additional \$500 to \$800/mo on his 32K CPU? He can easily do this by obtaining this specific Model 30 CPU (or any size or Model 360 CPU) from a leasing company on a one- to five-year lease. Besides a substantial discount from the IBM rental he also saves by not having to pay overtime charges.

Additionally, in many cases the rentals on peripherals are lower from a leasing company than those from non-IBM vendors; in fact, he could lease an all-IBM system identical to the one shown in your example from any of the major leasing companies at a lower cost. And today most leasing companies will allow an independent maintenance company such as Comma to perform the service function, cutting the user's cost still further.

A fully leased 360 at a discount and without overtime charges gives the user an alternative to any "new generation" hardware.

Robert A. Bardagy  
Eastern Regional Manager  
Marketing

Randolph Computer Corp.  
Greenwich, Conn.

### Whence Comes the Overhead?

Has Alan Taylor considered that part of the overhead [CW, Jan. 27] may be due to inflated (or more precisely, deflated) machine specification claims? I'm curious. . . .

George Steinitz

Monte Rio, Calif.

Computerworld welcomes comments from its readers. Preference will be given to letters of 150 words or less. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

## Navy-Burroughs Contract Keeps Everyone Smiling

WASHINGTON, D.C. — In these days when government contract overruns have been much in the news (witness the Lockheed C-5A hassle), it is refreshing to report

### D.C. Data-Line

By

Alan Drattell



I'm referring to the recent announcement by the General Services Administration that it has awarded a \$30,646,823 contract to Burroughs Corp. for 43 of its B3500 computers on behalf of the Navy's Automatic Data Processing Equipment Selection Office (Adepso).

The systems will be used in logistic applications at 22 Navy locations in the U.S. and overseas. At 21 of the sites, twin 3500s will share disk memory.

Although the procurement is expected to reach about \$54 million with the purchase of additional modules that will not be discounted in price, the initial contract represents a significant saving to the Navy — and hence to the taxpayer.

The dollar saving is believed to be in the area of \$20 million, and according to Capt. W. Fred Weihrich, the director of Adepso, "when viewed in the aggregate . . . a discount in excess of 53% was achieved."

Burroughs was one of five vendors bidding on the contract. The others, it was reported, were Univac, IBM, Honeywell and Control Data.

A significant factor in the Navy award, according to Weihrich, is the "installment purchasing" or lease-to-ownership method of computer procurement. Under this plan, which the official says was used in two previous Navy

contract awards by his office, title to the computers passes to the user after a given number of dollars has been paid under the lease plan.

Weihrich cited a number of other terms which make the contract particularly attractive:

- Guaranteed price contract for 90 months.
- "Options to advance or delay, with appropriate notice, installation dates by up to 180 days without additional costs.
- "The responsibility for assuring prompt response to calls for remedial maintenance has been shifted to the contractor, since the contract requires only that the government make a bona fide attempt to contact maintenance personnel at the contractor-furnished point of contact to effect the downtime credit provisions.
- "Guaranteed rerun of the benchmark test at the first installation of each activity type.
- "Software is treated as a separate end-item equivalent to equipment, for installation, maintenance and credit provisions of the contract. Thus . . . the vendor is in jeopardy of granting credits to the government should he not satisfactorily produce in the delivery, operation and upkeep of software items."
- "System availability is based on the system capability to process the scheduled workload rather than on the performance of individual components.
- "Credit for equipment and software malfunctions is based on a shorter time frame and at a higher rate than the Federal Supply Schedule (i.e., downtime credit for a purchase system is computed on the cost of a like rented system).
- "Provides for computer time necessary to rerun partially completed programs at no addition cost.
- "Contractor is required to maintain and support all software for the life of the systems, and, in addition, make available to the government all new releases or revisions."

# DP Failures Marked by Inadequate Human Responses

"I'll tell you why Neil Sutter doesn't know his math grades. He didn't bother to do the proper research that he is trained to do." This was the response made by John H. Moffatt, CDP assistant registrar for data processing at Arizona State University.

The reader may recall that Neil Sutter received a report grade that gave him a "Y." Unfortunately, Sutter did not interpret this grade because there was no "Y" listed on the grade code, nor indeed had anyone to whom Sutter spoke had such a grade.

To some extent Moffatt was correct in his assumption that Sutter had not done his research properly. The two men in fact knew each other and studied in the same classes. Moffatt felt that because of this Sutter could have easily contacted him. Sutter in fact had tried to contact Moffatt, but had received no response.

Sutter had not actually gone to any of the registry windows. To some extent Moffatt was correct in saying that Sutter could have discovered what grade "Y" meant.

But that would not have told him what his math grade was! The true answer as to why Sutter did not know what his math grades were is that the University of Arizona allowed its rules, regarding when grades should be sent in by the instructor of a class, to be ignored, and that in this case the instructor apparently ignored them.

This occurrence apparently has

been sufficiently prevalent in the past. Moffatt tells me that at least one case is still marked as being "course incomplete" a year after a student has completed his part of the course — that the data processing department had been consistently running special reports on just who has not yet reported their grades in. Moffatt tells me that these were given to the registrar each day, but then corrected himself and said "or at least they are put on his secretary's desk."

Despite this, late grades kept on being a problem, and a systems answer was given. A new grade, grade Y, was created and from the newly printed forms it was shown as being "Y . . . . No Report."

## Old Forms Used

The reason that Sutter did not realize the meaning of the newly created grade code "Y" was because the old forms were used for the first thousand of the run, and no one either in the data processing department, or in the graduate school who received the reports from the data processing department, noticed it.

Moffatt tells me that instructions were put on the operator sheet to use the new forms, and that there had indeed been a letter to the computer center earlier about the change in forms. Despite this, the first thousand of the run were put on the old forms which were then used up, and then the operator put the new forms on. Sutter, in graduate school, was included in the first thousand.

## Operator Defended

Moffatt defends the operator on the grounds that he had a fairly good case supporting his use of the older forms first. "Since this grade of 'Y,' " he said, "affected roughly 100 stu-

dents out of 26,000, his gamble was a pretty good one, that one of the first thousand students that would get an old form would have one of the new "Y" grades. Well, you win a few and lose a few. He lost."

So much for the facts. The question is: Is this of any importance to us generally? Does it affect our thinking about systems analysis?

I think it does, I think it has some very important lessons for us as well as for Tucson. Indeed the Tucson situation shows a welcome willingness of the data processing area to work with bad situations to improve them. The use of a daily report to the appropriate authority, and then noticing that they were not responding are good. The creation of a new grade form and new systems area, and, I am told the creation of a totally new system for grade reporting coming in halfway through this year, are more good signs.

The failure to totally place the blame on the operator, even though he apparently ignored what was on the run sheets, is also good.

Nor does the data processing area believe itself to be perfect. Moffatt tells me that in talking to the registrar on this matter he commented on all the other items where they had erred and where they could reasonably have been blamed, but where no one pinned them down.

## Poor Reasoning Shown

What I find instructive in this area is that after a number of basic university and data processing faults, the blame is placed on the student. "I will tell you why Neil Sutter does not know his math grade — he did not do his research."

And I also find it instructive to notice that the defense of the

STUDENT		BIRTHDAY		TELEPHONE		ROOM/ROOM		PERSON NUMBER		
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MINCH PARK JUNIOR HIGH										
SCHOLARSHIP REPORT					MARKING PERIOD					
COURSE	NO	TEACHER	1ST	2ND	3RD	4TH	5TH	6TH	CREDITS	
ENG	071	STEPHAN	55	361	2					
LIT	072	STEPHAN	55	361	3					
MATH	171	JAKUBOWI	55	2						
SOC STUD	271	MCCALLI	72	297	2					
SCI	371	PROSSER	60	460	4					
HOME EC	672	NYGAARD	80	1						
ART	771	SULLIVAN	73	2						
FRENCH	777	GEORGE	70	2						
MUSIC	871	REID	80	2						
PHYS ED	972	BUCKLEY	75	2						
DATE REPORT			TIMES TAYLOR			TIMES OVERSEEN			CREDITS TO DATE	
1 2 3 4			1 2 3 4			1 2 3 4			CREDITS TO DATE	
14			2			2			CREDITS TO DATE	
SIGNATURE OF STUDENT: TAYLOR ALISON J										
SIGNATURE OF PARENT OR GUARDIAN: _____										
DATE: _____										
FOR THE SECOND QUARTER										

The importance of the particular situation in Tucson is that it is representative of a prevalent type of problem — not that it is particularly important in itself. Just how prevalent is brought out ironically by the above junior high school report, which was previously published in this column after the first quarter of the year [CW, Dec. 9], as an example of poor design. The second quarter version shows still further degraded design, with "ATTENDANCE AS OF" overprinting and obscuring the title of the "PARENT SIGNATURE SLIP," and ironically, no math grade!

operator was equally fallacious. The operator did not, as Moffatt suggested, have good odds when he decided to use the old form for a thousand runs to start with. The numbers were 100 "Y" grades in 26,000 students. In the first thousand students the operator reasonably could expect four "Y" grades.

The odds were very much against him and yet the data processing expert, knowing these facts, could believe that these odds were good in favor of the operator not making an error!

## Annoyance Impairs Behavior

In short, when a fundamental flaw in a system, which management does not wish to be acknowledged, is brought to light by a data processing system, the result will often be a volume of annoyance which will impair the normal standards of working both inside the data processing department, and outside it.

The affair in Tucson is comparatively minor. Sutter now has his math grades, and passed above average. Congratulations! The old forms are no longer being used. But it is important to us because it shows the type of reaction that does occur when people are forced, by outside circumstances, into apparent dead ends.

In this case we had two highly educated, and computer-knowledgeable people. Both of them were working to get the math grades to Sutter at the time he was expecting it. Because of reasons outside the control of either they did not succeed, and the reactions to the failure were less than was expected of them. Moffatt actually did put his

finger right on the point when he said that the reason was that Sutter had not done the research as he had been taught to do. What Moffatt did not notice was that in a systems situation such as this you cannot expect people either inside or outside the department to react in the same cool way that they do in a university examination.

This is a fundamental factor often ignored in systems analysis. Indeed I have never seen it even mentioned. But thinking back I am sure that much of the problems involved in computer errors are the result of failing to appreciate that when a computer error occurs then you are going to have a lot of anger, fury, etc. And the people involved are not going to act as sensibly as a systems analyst might like them.

There is, of course, no real problem in this. There is nothing wrong with people acting like people. Computers are supposed to serve people and we had better accept them as we find them. All it means is that when you are doing some systems analysis, and in particular when you are dealing with the area involved in processing either computer errors, or organizational failures, do realize that you have got to cater to an unusual human situation.

Once you have realized this I am sure that your ingenuity will be able to work out techniques which keep everybody happy. And that will be a great advantage over our current unsatisfactory systems.

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## Letters to the Editor

### Beware of Drowning In Programmer Backwash

Re Alan Taylor's column [CW, March 17] on "Throwing Cobol Baby Out With Programmer Wash."

As a supervisor in charge of applications systems and programming, I well appreciate the problems which can result from uncontrolled programming practices — where computer programs are permitted to evolve through unstandardized standards and the individual ingenuity of the programmer who applies such standards.

When programs are permitted to be born in such an environment the result is almost predictable — a logically unpredictable coding technique which is only decipherable by the author. (Some refer to this as job security.)

Generally speaking, today's business applications programmer is a highly trained, educated and intelligent personality. There are, however, some who have not been able to make the transition from the highly intricate "machine language" days to the "common" days of Cobol. In either case, the commonness and simplicity of Cobol and/or the application of standards are looked upon by many as a personal affront to their integrity and individuality.

I am not defending such programmers and I heartily support Taylor's case in point. I feel, however, that he did not hit the nail squarely on the head with the suggested standards and his recommendation that "... unless an analyst-supplied guarantee that the program will never have to be read humanly is supplied . . . the program shall be rejected."

Such a guarantee extends beyond the realm of

"the twilight zone" and to reject them would be economically prohibitive. We are not in business to teach a lesson through rejection. The real crux of this problem is the absence of clearly defined objectives and standards (rules) by management and/or the communications void in passing them on to the people who are committed to do, or as in this case convicted if they do, the job.

This area of definition and application of standards should begin several levels above the programmer. It should begin with data processing management and be extended through the training of competent analysts to employ such standards in passing the problems on to the programmer.

Such standards for system design, definition, program specifications, program logic, coding structures and technique can be passed on to the programmer as to prohibit his coding to be indecipherable and not to be personally insulting.

I also feel that Taylor has left the ambiguity door wide open in his recommended standard that "programs shall be written so as to facilitate casual observer understanding . . ." I would like his definition of "casual observer understanding" as applied to programming.

I, for one, support Taylor's philosophy of standards in coding and am a staunch supporter of the "Kiss" method — Keep It Simple, Stupid! I do not believe, however, in attacking the tail of a biting dog.

Attack the problem at its source. If programming management were to reject finished programs as "dirty wash," I'm afraid they could very easily be drowned in programmer (and top management) backwash!

Robert B. Knepp, CDP

Bethlehem, Pa.



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## Symposium Agrees

# Users to Determine Fourth Generation

LONDON — If and when the fourth generation comes around, what it looks like is more likely to be determined by users than by manufacturers.

This was one speculation arising from a symposium conducted by Infotech, Ltd., one of a series exploring the state of the EDP art.

According to I.M. Barron, managing director of Computer Technology, a small UK manufacturer, there will be no more revolutionary computer generations because of the need of mainframe manufacturers to maintain the profitability of their investment in manufactured equipment. The EDP industry has become so large that even IBM would be broken by the need to accept return of billions of dollars of installed base and replace it with more billions of dollars of new equipment.

As a result, generation changes will be evolutionary, according to Barron, "mini-generations" designed to the needs and requirements of users rather than to the limits of engineering capability.

Users will thus have time — for the first time — to explore the possibilities of their systems, and will begin to demand greater efficiencies rather than more raw processing power.

According to K. Kolence, president of Boole and Babbage and a participant in the symposium, there will be a rising demand for systems measurement, "an engineering science in its infancy." Kolence said that because of measurement techniques new concepts will arise "in all areas of hardware and software de-

sign... [which] have the potential of improving systems efficiency by an order of magnitude..."

Oxford University don C. Strachey, commenting on the interplay between software and machine design, revealed that his experiments have shown that in some cases only four machine instructions account for 50% of the steps executed in a program, and that 2% of the operating system code is used almost the whole of the time spent within the operating system.

Strachey said that such information is vital to the mechanical design of computers.

The study includes 18 presentations and invited papers, as well as analysis of the presentations. They cover a wide range of subjects pertaining to the fourth generation, and are of varying levels of technical complexity.

Generally, though, they tend to support a theme of systems conceptualization of computing systems, refuting the history of computers as engineers' creations. There is a constant concern with the ultimate use of a computer and the need for manufacturers to supply what users want in efficiency and flexibility.

The edited panel discussion devotes some time to current techniques such as microprogramming and parallel processing, but while they evoke interest there is a feeling that the panelist consider them tricks and gadgets which are not as important as an integrated approach to systems design.

Parallel processing, for ex-

ample, was called by one panelist a "hardware gimmick." "...[T]hey decided to build a machine with an enormous number of processors at Illinois... and then looked around for problems that they could solve with it."

Transcripts of the papers presented at the symposium, and transcription of much of the panel comment are contained in a \$95, 500-page book published by Infotech.

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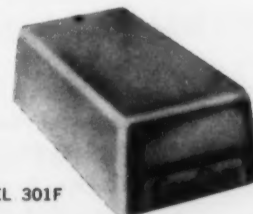
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## How Do Users Look at DP Investments? Article Paints Picture of Dissatisfaction

By Phyllis Huggins  
CW West Coast Bureau

"Business organizations around the world are losing hundreds of millions of dollars every year on their computers... Many senior executives now regard their computer systems as the worst investment their companies have ever made."

The author of this statement in an article in a recent edition of the British publication, *The Economist*, takes the computer community to task, drawing a sobering picture of the difference between the largely extolled virtues and wonders of DP and the harsh reality of what the user is really getting for his money.

He cites as one example the case of a New York company which budgeted a project at \$300,000 for development. The project has currently cost the firm \$3 million and is far from complete.

The company has had eight vice-presidents of data processing in seven years, and "number nine is not in very good shape."

This is not an isolated case; others are listed.

Some are super corporations with technologically sophisticated managements.

In one, the programming costs are rising 30% a year without any material improvements. Problems of converting from second to third generation computers are also covered by the author. He cites the case of one of the U.S.'s largest nonmanufacturing corporations which has had to budget \$6.5 million for converting programs, even though the existing systems were adequate.

The conversion was necessitated because the company was afraid IBM would cut off support for the second generation. The assistant vice-president for data processing told the author that he is "thoroughly and continuously disappointed with the level of support we get from IBM."

The executive said the company brought in an RCA computer for a while, which precipitated some action from IBM, "but the other computer manufacturers aren't any better. Nor are the software houses and consultants on which we spend \$700,000 a year."

He ended on a hopeful note however, saying that while theoretically they are supposed to get 15 to 20 jobs on the machines they are getting four and a half — "but four and a half is good."

The author estimates that nearly 50% of the companies using computers are disillusioned with them and perhaps 10% to 20% consider their computer projects outright disasters.

He partly blames the fact that certain types of people dominate the industry — electronics engineers and salesmen. As a result, he says, great advances have been made in engineering which far outstrip our ability to use them. Advertising brochures stress engineering — "electronics engineers writing to impress other electronic engineers with only oblique statements as to how any of this might help the customer."

He blames the salesmen for their hard-sell approach which has rushed many otherwise hard-headed businessmen into the computer mystique with little idea of what computers were all about.

Data center executives are taken to task for wanting all the newest hardware which management blindly has rubber-stamped — until the request came for a change from second to third generation.

## Column Takes Action And Backs Computer

By a CW Staff Writer

POMONA, Calif. — Quit blaming machines for personnel problems and incompetence, an "Action Line" newspaper column has warned a major magazine.

While many popular public service columns continue to blame automation for consumer billing and subscription problems, the "Action Line" in the Pomona *Progress-Bulletin* is an exception.

A recent column devoted over half its space to chastising *Christianity Today* magazine for "passing the buck" on its subscription ills.

Noting "no one is more aware of the computer foulup... than Action Line," the California column countered with the tried-but-true computer cliché: "they only do what they are programmed to do."

"So the computer problem is a personnel problem — a people problem," the Pomona *Gazette* said. "Apparently the computer programmers and other staff are not adequately trained, or perhaps computer technology is moving so fast that adequately trained personnel are full of information that is obsolete before they go to work," the column suggested.

"Action Line" then called on the magazine to "practice a little Christianity today and quit pointing the finger at a machine, and hire or train competent personnel."

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## Random Notes

**The Computer Company Cuts DOS Link-Edit Time by 50%**

RICHMOND, Va. — An F-level Linkage Editor, for use with DOS/360, has improved associated timings 50% to 80%, and is especially effective in multiprogramming systems, according to the developer, The Computer Company (TCC).

Used in conjunction with the standard linkage editor supplied by IBM, the TCC editor provides under DOS an alternative based on the amount of storage available. The swapping between the IBM and TCC editors is transparent to the user. The F-level Linkage Editor is available for \$750, including guaranteed maintenance, from TCC in the Seventh and Franklin Bldg.

**Interactive Cobol Debugging Added to AI/Com T/S Network**

PRINCETON, N.J. — An improved interactive Cobol system with an on-line debugging facility has been implemented on the AI/Com time-sharing network.

The AI/Com Cobol includes most features from Ansi level II and selected features from level III, the company said. With the debugging support (Deb/Cob), users may specify, by source language reference, pauses during execution and selectively print or change data fields.

The firm is at 1 Palmer Sq.

**Ancom General Ledger Software Adapted to Honeywell 200s**

LOS ANGELES — A general ledger system, originally developed for use on the IBM 360, has been adapted to run on the Honeywell 200 series, according to Ancom Systems.

The system can process up to 999 different companies and provides six levels of management responsibility reporting.

The Honeywell version of the system, written in Cobol, produces 13 different accounting reports. It requires 32K of core and three files, one of which must be a disk. It is \$12,500 from 8929 South Sepulveda Blvd.

**Beam, Column Drawings Plotted**

BIRMINGHAM, Ala. — Finished shop drawings for the fabrication of steel beams are produced on a digital plotter with the Detailing by Computer-Beams (Decom-B) package from Computer Wares Inc. A similar package, Decom-C, produces drawings for columns.

Working from user-provided parameters, Decom-B draws detail on beams and all blocks, flange cuts and holes, internally connecting beams and bracing brackets. With Decom-C, three views of the column are plotted, including grit clips, slice plate hole patterns and holes for internally connected beams. The programs are written in Fortran and operate on a 32K 360/25 with two 2311 disks. Decom-B is available for \$25,000; Decom-C, for \$10,000, from 745 N. 41st St.

**Cyphernet Adds QC Support**

ANN ARBOR, Mich. — Users in the Midwest can compute means, standard deviations, correlation matrices and confidence levels with a package of quality control programs on the Cyphernet Statistical Library.

The structure of the programs is compatible with others on the Cyphernet time-sharing service. Cyphernetics is at 333 Maple Village Center.

**'Print-Fast' Overlaps DOS Processing**

By Don Leavitt  
CW Staff Writer

PHILADELPHIA — IBM 360 users operating under either TOS or DOS can maximize printing and processing for Assembly Language or Cobol programs with the Print-Fast printer support package from Atlantic Software Inc.

Accessible as a callable subroutine or as a macro instruction, Print-Fast improves on printer handling directly, rather than boosting throughput spooling or other

secondary approach. With two buffers the package is said to provide twice as much overlap as comparable double-buffering controlled by IBM software.

While not a spooling technique, Print-Fast allows the user to move in that direction. The Print-Fast macro permits the definition of as many buffers as the user can fit within memory. In addition, the package includes a device-independent feature that permits normal printer output to an IBM 2400 series tape drive or a

2311/2314 disk unit, or to a printer.

Output moved to tape or disk by the Atlantic software can be transferred to the printer with normal utility programs, after the originating run has been completed.

No modifications to the user's operating system are necessary, according to Atlantic, but some reorganization of Cobol source programs would be required. The print file, normally defined in the file section of the data division, should be shifted to the working storage section for Print-Fast.

The Print-Fast logic requires about 200 bytes of memory. The only other storage consideration would entail the number of extra buffer areas to be used.

The Print-Fast package is available for \$1,250 from 312 Lafayette Bldg., at Fifth and Chestnut.

**'Fastball 71' Entries Generate Cobol Data Division, I/O Code**

GRAND RAPIDS, Mich. — IBM 360 users can reduce the time and effort needed to prepare the basic structure of Cobol programs, with the Fastball source statement generator from Brown Bros. Enterprises. The system is intended to get new programs "off the ground" with correctly coded data division entries and the coding required to move data fields from input to output files.

Fastball 71 provides IF statement logic and arithmetic computations. The user who wants more complex logic has to add his own conventionally coded procedure steps to the Fastball generated source deck. Unlike a number of source code generators, Fastball does not include shorthand notation for all the Cobol verbs.

Fastball can serve as the starting point of all Cobol program writing, Brown Bros. said, noting that it can handle report generation and summarization, and file creation, updating and copying, directly. Reblocking, changing of record sizes and reorganization of indexed sequential files are also effectively handled by Fastball, the company said.

Since the Fastball system imposes a basic program logic on its users, it is said to be an ideal means of teaching Cobol programming to trainees.

Fastball operates under DOS/360 and requires 32K, a 2311 disk, a card reader and a punch. Available in versions that

generate Cobol D of F, or ANS coding Fastball 71, including the IF logic and 10 levels of totals, sells for \$785, from the firm at 509 Fuller Ave., NE.

**Mitre Has T/S, Batch Services For Local, Government Agencies**

BEDFORD, Mass. — Federal, state and local government agencies can use the batch and time-sharing capabilities of an IBM 360/50 with 512K core, at the Mitre Corp. Bedford Computer Center. These facilities are not available to commercial users, a spokesman said.

In addition to the half-million bytes of high-speed core, the Mitre configuration includes a million bytes of Large Capacity Storage (LCS) under OS/MFT-II. Twelve IBM 2314 disk drive modules and five tape drives, including one 7-track model, are also available. Service is on a first-come-first-served basis.

Time-sharing at Mitre includes Conversational Programming System (CPS), Conversational Remote Batch Entry (CRBE) and Administrative Terminal System (ATS).

Mitre also supports a number of application program products, ranging from General Purpose Simulation Package (GPSS), through scientific subroutines for Fortran

and PL/I, to a Mathematical Programming System (MPS). An Assembly program for the IBM 1800 computer is available. The assistance from systems programmers and keypunching related to use of the Bedford Computer Center is also provided.

**Competitive Prices**

Time-sharing services from Mitre are billed on the basis of CPS "interpreter time" at \$5.75/min, connect time at \$5/hr and page time at \$1/hr/4K page, or subpartition of memory. Disk storage in time-sharing is available at 50 cent/track/mo.

Although the Mitre charges appear in some cases to be higher than those of normal commercial utilities, company spokesman note that the system accounting procedures followed by Mitre in fact keep the charges "at least competitive."

Mitre Corp. can be reached through P.O. Box 208.

**File Access, Larger Workspaces Called Key APL Improvements**

Many of the time-sharing networks that provide APL capability have overcome the limitations of the language noted in the story entitled "APL Commercial Processing Growing" [CW, March 17].

The comment in the earlier story noting that "intermediate results from one workspace cannot be carried over to another, and large files on tape or disk are simply not available" referred to the IBM-provided APL system only.

**Unlimited Program Size**

During the past year network enhancements have included large file processing and either workspaces larger than the standard 32K or workspaces that can be linked together without user effort, to form virtually unlimited program size. The large disk files may be shared by multiple time-sharing users on several networks, which include security provisions to avoid unauthorized access to the data.

Carryover of results and improved report formatting are further recent APL extensions for commercial data processing. In many cases, the enhanced APL is available for in-house installation.

Among the networks with advanced APL systems are APL Plus, by Scientific Timesharing Corp., Washington, D.C., and Action/APL, provided jointly by The Computer Company, Richmond, Va.; APL Services, Inc., Trenton, N.J.; Computer Innovations, Chicago; and Proprietary Computer Systems, Van Nuys, Calif. The network of Time Sharing Resources, Inc., New York, also provides enhanced APL. APL General, Princeton, N.J., has an advanced APL file system available for in-house implementation.

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**Visit Ampex, Booth 2217, Spring Joint Computer Conference.**

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**AMPEX**

April 7, 1971

Page 15

## Bits and Pieces

### Incremental Cassette Unit Responds to Ascii Control

DALLAS — The Termicette Model 4000 from International Computer Products, an incremental cassette recorder, is plug-to-plug compatible to any EIA RS-232 modem, terminal, Teletype, printer or computer.

It is responsive to Ascii control codes allowing such applications as unattended operation, off-line program preparation, low-cost program and data storage. The unit works at speeds of 110, 150 or 300 bit/sec with additional speeds of 600 and 1,200 bit/sec optional. It can be used off-line or on-line, does back and forward spacing, and allows either continuous or incremental operation. It is compatible with either half- or full-duplex systems. The unit is priced at \$1,490. Delivery is available in 30 days through P.O. Box 34484.

### Printer/Plotter Speeds Raised At No Increase in Cost to User

CUPERTINO, Calif. — Versatec has increased the output speed of three recently announced printers and plotter at no increase in cost.

The increased speed for the Matrix 1300 printer results in an output of 480 line/min up from 300 line/min. The Matrix 1100 plotter has an increase of about 40% in writing nib density. The Matrix 1100A combines the 480 line/min print rate and the higher density plotting.

The Matrix 1300 sells for \$6,700 or leases for \$230/mo. The Matrix 1100 sells for \$7,200 or leases for \$240/mo. The Matrix 1100A sells for \$8,800, or leases for \$290/mo. Shipments will begin in July from 10100 Bubba Road.

### Twin-Recorder Data Storage Unit Interfaces IBM 2741 Terminal

SAN JOSE, Calif. — The Tellog Corp.'s TC-3 magnetic tape cassette data storage unit is designed to interface with the IBM 2741 or equivalent terminals. Two digital recorders are provided to allow copying and editing of up to 70,000 characters of data stored on each cassette.

The unit is priced at \$2,200 and is available on a 90-day schedule from 7633 West Hill Lane.

### Rugged Version of DEC PDP-11 Designed for Shipboard Service

MAYNARD, Mass. — If you need a 16-bit mini that can withstand 4Gs while vibrating at up to 500 Hz in unusual positions, the DEC PDP-11R20 just might fill the bill.

Intended for shipboard applications, it can operate at a relative humidity up to 95% and a temperature range from 32°F to 122°F. Shocks up to 5Gs for a duration of 11 msec can be withstood during operation, DEC claims.

The rugged mini is compatible with the standard PDP-11 and sells for \$13,900. It will be available late this spring.

### Cabinet Holds Tape Cassettes

SOUTH HOLLAND, Ill. — Cassette filing cabinets from the H. Wilson Corp. are available in a one-drawer CAS model that holds 174 cassettes and a two-drawer 2-CAS model that can hold 348 cassettes.

The cabinets have extension arms for access to back rows and have positive stops to prevent accidental spills.

The CAS is priced at \$55 and the 2-CAS at \$82. They are available on four-week delivery from 555 West Taft Drive.

## Simulates IBM Controller

# Interface Connects Varian 620 to 360

By Frank Piasta  
CW Staff Writer

IRVINE, Calif. — An interface from Varian Data Machines will allow 620 minicomputer users to interconnect directly with the IBM 360 series.

According to Varian, the Interface Control Unit (620/Icu) appears to a 360 as an IBM 2803 tape control unit with 16 tape drives attached. The device responds to standard IBM tape commands, even

simulating tape motion, Varian said.

A similar unit was announced last summer by Datawest for connecting other minis, including the Data General Nova, General Automation SPC 16, Honeywell 316 and Lockheed Mac-16, to the IBM 360.

The minicomputer, Varian said, can be used for data acquisition, data reduction and formatting, and data transmission in large block formats allowing the larger

CPU to be used more efficiently for batch processing.

The cost of the system is kept low, the company said, by the elimination of any need for additional hardware interfaces or for special 360 programming. The 620/Icu, Varian said, allows use of the 620 computer as an on-line/off-line storage and processing device.

In most applications, Varian said, the 620 would be used for data acquisition, job stacking and preprocessing of data. At one installation, for example, raw data from many types of instruments used in geophysical research is fed into an IBM 360/65. In the 360, the information is processed and sent to a Varian 620/i which prepares the data for display on a CRT and acts as a programmed controller for the CRT operation.

The 620/Icu is priced at \$10,000, and is available on a 90-day delivery schedule from 2722 Michelson Drive.

## Potter Produces Plug-to-Plug Replacement for IBM 3420/3803

MELVILLE, N.Y. — An independent peripheral tape system for 360 and 370 users has been developed by Potter Instrument Co. to replace the IBM 3420/3803 magnetic tape units.

The Potter 3420, similar to units offered by Storage Technology, Telex and Texas Instrument, offers the user complete hardware and software compatibility at a lower price than the comparable IBM units.

The Potter system consists of a TC5805 Tape Controller and three models of magnetic tape units. The AT3423 is rated at 75 in./sec to replace the IBM 3420 Model 3. The 125 in./sec AT3425 is similar to the IBM 3420 Model 5. The AT3427, at 200 in./sec, competes with the top of the line IBM 3420 Model 7.

### 9-Track Tape

Seven-track recording at either 556 bit/in. or 800 bit/in. is offered. The drives can also be equipped to read 9-track tapes at either 800 or 1,600 bit/in.

The Potter system follows the IBM lead in offering as many as eight drives connected radially to the controller.

This arrangement allows any drive to be taken out of service for maintenance without disturbing the other drives attached to the controller.

The Potter system also follows IBM in handling the analog-to-digital signal conversions in the drive rather than in the controller.

The Potter transports also feature automatic threading, a motor-driven automatic latching hub and single capstan drive with in-column rewind. Technical improvements include a micrologic digital interface and built-in test alignment generator.

The Potter TC805 controller is priced at \$550/mo, compared to the IBM price range of \$675-\$750. The price range of the Telex controller is \$575-\$835.

The 3423 is priced at \$400/mo, the 3425 costs \$500/mo, and the 3427 will lease for \$600/mo. Rental prices for the IBM drives range from \$440 to \$695, and the range for the Telex equivalents is \$375/mo to \$595/mo.

First deliveries are scheduled for the second quarter of 1972, Potter said.

## Atron Unit, 360/20 Compatible, Cuts Communication Costs 25%

ST. PAUL, Minn. — The Atron Model 20 terminal is intended to be a lower-priced alternative for the 360/20 user who dedicates his system to communications programs.

Said to save the user 25% to 50% over the cost of the 360 systems, the Atron can perform some pre- and post-processing, but lacks the capability to be a complete replacement for the IBM system.

The Atron system uses the company's 501 Datamanager computer, said to be comparable in power to the 360/25 and twice as fast as the 360/20, Model 5. Software must be written in either Assembly Language or a compiler-level macro language called DPL, said to require about half as many instructions as Fortran. No standard language compiler is offered.

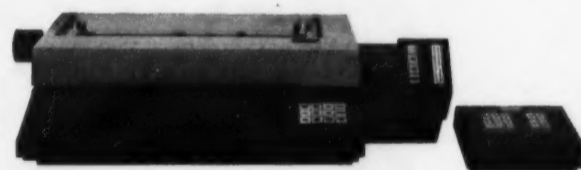
All of the standard functions and features are provided, Atron said, including: Ebcidic with transmit transparency, compression/expansion of data, keyboard/printer control, RJE standardized user Exit interface, Haps multileaving communication, communication speeds from 2,000 to 9,600 bit/sec and special high-speed communications from 19.2 to 40.8 Kbit over Telpac Dataphone-50 lines.

The Atron system offers more throughput than the IBM system, offering overlapped communication and I/O processing and interleaving of card reading, printing and operator messages.

The Atron Model 20 is available in two submodels. The 20-1 is equipped with a 501 with communication capabilities and eight to 32 Kbytes of core memory. It also includes a 300 or 400 card/min reader, 300 line/min chain printer and a Teletype ASR 33.

The Model 20-2 has the above 501 plus a 1,000 card/min reader, 1,250 line/min drum printer and a Teletype ASR 33. Magnetic tapes, CRTs and card punches can be attached.

Prices for the Atron Model 20 system range from \$1,165/mo to \$2,120/mo. The systems are available on a 60- to 90-day delivery schedule from 1256 Trapp Road.



The Novar 10 key numeric input on the right can be added to Novar tape terminals by plugging it in. Greatly speeds up the terminal's capability to handle numeric data for computer processing. Does columnar tabbing too.

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## Cassette Unit Called Best Storage Value

NEWTON, Mass. — Said to surpass other I/O media on a cost/performance basis, a cassette recorder/reproducer, called the GRI-sette, has been introduced by GRI Computer Corp. for its GRI-909 computers.

Designed to replace paper tape readers and punches, the GRI-sette has a capacity of more than 10 Mbits. The read-write rate is 2.84 bit/sec, equivalent to 2.84K char/sec, the firm said.

The system software required to operate the device is included in the price of the unit and includes a library loader/writer and an operating system with block search capability. The company said it will provide users with prerecorded cassettes containing other GRI software and diagnostic routines.

The desk-top unit is furnished with a single interface card

which plugs directly into the universal bus system of the computer. The connection to the computer is via a 10-ft coaxial cable. One uses a single unit for both reading and writing, while a second uses read-only and write-

only units.

The price of the basic GRI-sette is \$690 and includes an interface controller and operating system software. It is available on a 30-day schedule from 320 Needham St.

## Interactive System Aids Architects

BOSTON — An interactive graphics-oriented computer system, the Architectural Interactive Design System (Aids) from Design Systems, is intended to aid the architect.

The hardware consists of a PDP-15 with 16K, three tape drives, 300 card/min reader, 250K word fixed head disk, electrostatic printer and two CompuTek storage tube scopes controlled by a tablet.

The software based on DEC

packages with the addition of special drivers is designed to use the display scopes to sketch, scale, zoom, window, rotate and move or delete single or multiple items.

The cost of the hardware is under \$100,000. Software costs will vary, but typically range from \$75,000 to \$125,000, the firm said.

The Aids system is available on a four- to six-month delivery from 6 St. James Ave.

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## Bits and Pieces

### Plug-to-Plug Fixed Disk Offered for Nova Minis

SUNNYVALE, Calif. — A plug-compatible fixed-head disk memory system for the Data General Nova, produced by Data Disc Inc., ranges in size from 65K to one million words.

A 32-word memory in the controller permits the 1771 to receive and transmit data through the computer's channel with fast average transfer rates but with long response times between channel requests, permitting programming with no restrictions on the length of instructions or the levels of indirect addressing.

Prices start at \$6,930 for the 65K model and go to \$18,100 for the 1-million-word model. Delivery is 45 days from 686 W. Maude Ave.

### Transitel Reduces Prices by 30% On Short-Term Keytran Leases

DENVER — A 30% reduction on one-year lease rates for Keytran data entry systems was announced by the Transitel Division of the Sangamo Electric Co.

In a typical 30 station Keytran configuration, the company said, the one-year lease rate would be approximately \$120 per keyboard display unit (KDU) per month under the new pricing structure. Under prior pricing the cost was about \$170/KDU.

Transitel Computer Support Systems Division of Sangamo can be reached through P.O. Box. 7255, Park Hill Station.

### Forms Handling Table Designed For Printers Includes Shelves

HUDSON, N.H. — A system of forms handling equipment for use with tabletop line printers from Centronics Data Computer Corp. includes a printer stand unit and a modular paper stand with three adjustable shelves.

The steel stand comes equipped with a walnut-grained laminated top and is color-coordinated to the printer. Single unit prices start at \$175 from 1 Wall St.

### Paper-Tape Winder Is Hand-Held

CUPERTINO, Calif. — The hand-held Model 501A Automatic Paper Tape winder from Craft-Art can retrieve a 100 ft length of tape in less than 10 seconds. Since winding speed is controlled dynamically, the company said, the device provides the most gentle means of handling paper tapes. The unit is available at a cost of \$50 through P.O. Box 506.

# Honeywell's new computers introduce a little magic to banking.

Magic new hardware. Our new Series 6000 computers work wonders — like multi-dimensional processing, which lets you dip into your customer information file, accept transactions from terminals, receive a batch of branch data, and run several other jobs, all at once. And for our Series 200, we have three new small-to-medium banking computers.

Magic new peripherals. We've got a new document handling

terminal for remote MICR entry that features six-pocket sorting. You can put it in your branch or a correspondent bank and it works off-line, or it communicates over the telephone to a computer. We've got a new high-speed MICR reader-sorter that reads 1625 documents a minute and sorts in up to 32 pockets. And it interfaces with either our Series 6000 or Series 200 computers.

Magic new applications packages. We have a new document entry system that can control as many as six MICR

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## GTE Units Appeal FCC Computer Decision

By the CW Technical Staff  
NEW YORK — GTE Service Corp. and GTE Data Services Inc., both subsidiaries of General Telephone & Electronics Corp., have appealed the recent Federal Communications Commission ruling concerning the separation of data processing and communications services provided by common carriers [CW, March 24].

In its ruling, the FCC said it was "prohibiting a common carrier from obtaining any data processing service from its data affiliate."

According to GTE, the FCC order prohibits data processing affiliates which serve common carriers from providing their services to outside customers.

Under its charter, GTE Data Services now provides data pro-

cessing services to the telephone operating companies of GTE and also furnishes computer-based

### Communications

services to outside business and financial organizations.

A GTE spokesman said: "It is our understanding that it is the intention of the FCC order to permit the provision of data processing services to GTE telephone operating companies by their affiliate, GTE Data Services."

In a supplementary notice the FCC's Common Carrier Bureau told GTE that it interprets the commission's ruling as allowing a carrier to obtain data processing

services from a "separate corporation exclusively devoted to providing such services to carriers." Under this interpretation the separate corporation could serve only the carrier and would be prohibited from providing data processing services to any other organizations, an FCC source told CW.

The two GTE subsidiaries filed their petition with the U.S. Court of Appeals for the Second Circuit, New York.

A spokesman for Western Union said that his company is studying the order, and has not yet decided what action it will take. United Utilities said it is considering the matter.

## N.Y. PSC Sets Rochester Hearing on Data Tariff

ALBANY, N.Y. — Hearings to explore an interconnection plan proposed by Rochester Telephone Corp. have been set for April 20 by the New York Public Service Commission (PSC). Although higher phone rates could result, users have thus far shown little interest.

The plan was part of a tariff proposal filed by Rochester Telephone [CW, March 10] to simplify the interconnection of non-carrier equipment. Under the tariff, Rochester Telephone, an independent carrier, would create a new class of service for data users with customer-owned and maintained (Coam) equipment.

A PSC spokesman told CW that the hearings will be held in the Hall of Justice in Rochester.

Although the tariff, if approved, could raise rates for data users, no affected persons have indicated an interest in participating in the hearing. A PSC spokesman told CW that the commission would welcome comments from interested users.

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## Data Briefs

### Automatic Types Set Pace Of Bell DAA Installations

WASHINGTON, D.C. — The use of Bell Data Access Arrangements (DAAs) increased sharply in the last two months of 1970. Almost 500 DAAs were installed during November and December, according to an interconnection report recently filed with the Federal Communications Commission by AT&T.

The new report also showed that the use of Automatic DAAs is growing faster than the use of manual units.

### Phonplex Voice Response Unit Combines Phonemes Into Words

HUNTINGTON, N.Y. — Users are able to enter data to a CPU through a Bell Touch Tone telephone and receive verbal responses, with the Voice Response Unit (VRU) system from Phonplex Corp.

The VRU can store a virtually unlimited vocabulary, Phonplex claims, since it uses "phonemes" stored in solid state memory. Phonemes are the smallest units of speech that distinguish one sound from another.

The basic VRU, Model 7050, includes a 50-word vocabulary plus five phrases, all user-specified. It costs \$19,000 from 789 Park Ave.

### 2,400 bit/sec Penril Modem Uses Unconditioned Lines

SILVER SPRING, Md. — The PDC 2400B-1 modem from Penril Data Communications, Inc. provides 2,400 bit/sec full duplex operation over unconditioned lines, and on-line compatibility with the Bell 201B dataset, the company said. It is priced under \$1,350 from 10145 Colesville Road.

### RFL Describes Teleprocessing

BOONTON, N.J. — Users considering teleprocessing can gain a basic background on the subject by reading *Data Communications and the Data Modem*, a booklet available from RFL Industries Inc.

## University Research Gets Assist

IRVINE, Calif. — The University of California branch here has selected a large computer to form the heart of its DP center and to assist in faculty and graduate research in the physical sciences.

The primary function of the DEC PDP-10 computer is to aid in research. The computer can perform real-time operations in a time-shared and batch processing mode simultaneously.

Dr. Paul E. Condon, an associate professor of physics and one of two men in charge of the school's DP center, said that the research being carried out with an assist from the PDP-10 included a variety of projects in solid state and high energy physics.

### Batch Mode

Condon explained that most of this work is best done in the batch mode because of the size and complexity of the problems involved. The sequence of commands required to run the necessary programs is often so long that processing the data in any other way besides on decks of punched cards would be impractical and uneconomical.

While the computer's main role will be batch processing, it will be time-shared to some extent, mainly for investigating system software and checking on system operation. It also is expected to see service in the teaching of programming, in work in the social sciences, in student registration, course grading, and inventory control.

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Reference number 21/3/DD

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## Blind Programmers Get New Group

NEW YORK — A new international cooperative organization in the DP field, created by and for blind programmers, has been formed to help blind programmers help themselves to progress professionally in their work.

Visually Impaired Data Processors International (Vidpi) held its first regional conference in the New York area recently and scheduled future programs.

A periodic newsletter will be published in Braille, designed to keep Vidpi members up to date on the latest developments pertaining to their work in the DP

field. Pertinent articles will be selected and condensed, and original articles of special interest to blind programmers will also be written for the newsletter. A commitment for Braille and mailing the new publication has

aid blind programmers.

A counseling service within Vidpi will be created to aid blind persons entering, or thinking of entering, the DP field. Vidpi plans to work closely with existing rehabilitation counselors in helping to determine the qualifications necessary for blind persons to begin programming training.

There will also be periodic swap sessions, in which blind programmers can discuss mutual problems, and learn of new technology and equipment introduced into the field.

### Education

been obtained from the Library of Congress.

Vidpi will investigate ways to use its professional influence to secure governmental funding for research and other projects to

## DP Workshop Draws Early Registrants

CHICAGO — An opportunity to discuss computer protection and insurance with experts has drawn many early registrants for the *Business Insurance-Computerworld* Computer Workshop.

The one-day session will be held June 14 in the Pick Congress Hotel here and will include question and discussion periods.

Workshop faculty members will include representatives of the computer manufacturers, fire prevention authorities, property liability insurers and industrial safety men as well as officials of companies that operate or lease computer equipment.

Some of the subjects of discussion are:

- Effective computer fire protection systems.
- Security against intrusion

and theft prevention.

- Prevention of computer damage through power failures.

- Safety and psychological security for computer room workers.

- Liability and property insurance for computers.

The registration fee before June 1 is \$90 and the regular workshop fee is \$105. This fee covers admission to all sessions, breakfast, two coffee breaks, lunch and a complete workshop

notebook.

The publishers of *Business Insurance* and *Computerworld* launched the workshop in response to wide interest in computer protection and insurance among management personnel.

So if you desire a practical one-day school designed to provide participants with many useful ideas, fill out the coupon on this page and return it with the low-cost advance registration fee.

Send to: Computer Protection/Insurance Workshop  
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Please enroll me for the Computer Workshop to be held Monday, June 14, 1971, in Chicago at the Pick Congress Hotel. The advance registration fee of \$90 is a saving of \$15 from the regular price, \$105, if postmarked before June 1. If my plans change and I can't attend, I will get a complete refund (less \$15) by notifying you before June 14.

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# computer industry

a Computerworld news section about the nation's fastest growing industry

April 7, 1971

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## CI Notes

### High Services Growth Seen

PHOENIX — The 1971 growth of the services segment of the computer industry will exceed the 30% predicted earlier this year, Bernard Goldstein, Adapso president, told the organization's 31st management conference.

"The current economic upsurge has revitalized the data center and associated services business, and as a result, we can expect projections better than we had anticipated," he said.

### Century Plans 3330 Replacement

ANAHEIM, Calif. — Century Data Systems, the Calcomp disk drive subsidiary, says that it will be among the firms left when the race to produce a 3330-compatible unit is over. The firm said that it would announce a 3330-compatible unit soon — the 230 — possibly even before the first IBM deliveries. Hints are being dropped about demos at either the SJCC or FJCC.

### Digitronics Sues MSI Data

ALBERTSON, N.Y. — Digitronics Corp. has filed suit in the Federal Court in New Jersey charging MSI Data Corp. with the infringement of a patent for an acoustic coupler.

The complaint alleges that MSI Data Corp. is manufacturing, using and selling a device that infringes Digitronics Corp. patent No. 3,553,374 covering an acoustic coupler. The suit is in addition to suits previously filed by Digitronics against the same party, alleging infringement of Digitronics' patent No. 3,408,572 for Controlled Amplitude Frequency Shift Signal Generator, Digitronics' patent No. 3,472,448 for Recording System for Business Machines, and further alleging unfair competition and conversion.

### Peripheral Firms Get GSA Pacts

WASHINGTON, D.C. — Three peripheral companies — Ampex Corp., Tracor Data Systems, Inc. and Texas Instruments, Inc. — have been awarded contracts by the General Services Administration totaling more than \$5.7 million to replace existing IBM 729 and 2401 tape drives and 2311 and 2314 disk drives in at least 12 federal agencies. Ampex was awarded \$1,771,169 for tape drives, Tracor \$2,146,435 for disk drives and Texas Instruments \$1,785,380 for disk drives.

## Supershorts

Energy Conversion Devices, Inc. has formed a subsidiary company, Ovonic Memories, Inc. (OMI) to manufacture and market optical mass-memory systems utilizing ovonic material as the information-storage medium. The new company will have facilities in Los Angeles.

The General Services Administration has accepted Kybe Corp.'s line of magnetic tape cleaners, magnetic tape testers, tester/certifiers and automatic disk pack cleaners for the 1971 Federal Supply Schedule. The GSA listing, under contract number GS-00S-84604, covers Kybe's new TC-10 Magnetic Tape Cleaner, the E-24W QPL qualified cleaner as well as the TMS-70 and TMS-200 Cleaner/Tester/Certifiers.

## Despite STC Protest

# DSA Goes Ahead With Award to Potter

By Alan Drattell

CW Washington Bureau

WASHINGTON, D.C. — The Defense Supply Agency has gone ahead with an award to Potter Instrument Co. Inc. despite a pending protest lodged by Storage Technology Corp. with the General Accounting Office, the agency that keeps check on the federal purse strings. The award, according to DSA, will save the government an estimated \$20,000 a week.

The pact is for 155 units, including 126 magnetic tape drives and 29 disk storage devices, and it could amount to \$5,442,000 over a three-year period.

A spokesman for DSA told CW that regulations permit an "award to be made despite a pending protest when it is determined that a prompt award will be advantageous to the government."

"DSA concluded," he continued, "that STC's protest did not have merit and that since, as compared with prior leasing arrangements, estimated savings of

\$20,000 per week would be realized, it would be advantageous to the government to make the award."

The protest charges that Potter "will enjoy 'windfall' profits" if the DSA does not convert-to-purchase in 18 months the peripheral equipment that it is renting from the Plainview, N.Y., manufacturer.

STC says that the "windfall" could amount to an additional \$2,592,960 for Potter over the announced winning bid price of \$5,442,000.

STC claimed in its comments that there is no guarantee that DSA will be able to purchase the rented units 18 months from now, and Potter, under the contract, will continue to receive rental income.

The profits that Potter would thus realize, it contended, represent in effect a "buy in" by the vendor on DSA's contract, and buying in, according to STC, is prohibited by the Federal Government.

In addition, the Boulder, Colo., company questioned a percentage factor for

"residual value" as used by DSA, and added that the agency failed to extend its "value of money" factor to cover monthly maintenance costs.

As a result, "purchase costs can be inflated by including maintenance costs — thereby increasing the residual value of the equipment," the protest stated.

STC explained that "purchase prices can be inflated by offering 'free' rental months — and yet allowing those 'free' months at list prices toward a subsequent purchase. This is identical to offering not merely purchase-option-credits of 100% but rather purchase-option-credits in excess of 100%. This, in essence, is a blatant case of a contractor 'buying in' on a rental procurement by offering absurd purchase-option-credits against a purchase price inflated by the value of those credits."

The protestor claimed that Potter's DSA price is \$21,250 for its tape drive, including \$3,600 hidden maintenance charges and \$1,650 for three months' "free" rent.

Earlier, DSA told CW that STC's protest "did not have merit and that, since as compared with prior leasing arrangements estimated savings of \$20,000/wk would be realized, it would be advantageous to the government to make the award" to Potter.

A spokesman for Potter, when informed of the GAO filing, said, "since we have not heard from the government about the protest, we have no comment. We are proceeding under the terms of the contract to prepare to deliver equipment to DSA."

GAO, meanwhile, said that on the basis of the comments it will probably have to go back to DSA for additional information. An official with GAO said the agency could not indicate when a decision on the protest might be made.

Other bidders on the contract included Memorex, IBM, Tracor, Texas Instruments, Ampex, Telex, Calcomp, National Computer Rental and the Halsey Corp. BASF had withdrawn from the bidding earlier.

## Keypunch Adapter Device Crux Of Suit Against IBM by 3 Firms

NEW YORK — IBM is being sued, again, because a product improvement has allegedly hurt its competition.

When the industry leader improved its 450 sort program, Programmatic sued because a user had to have the 450 sort to run Programmatic's package, PI Sort. When IBM announced that the 2319 disk unit could be used with the 360, independent peripheral makers of 2314-compatible units asked the government to intervene in the antitrust arena.

Now Data Research Corp., International Data Terminals Inc. and Western Union Computer Utilities Inc. are suing because of IBM's new 129 keypunch. DRC developed a device that adapted the old IBM 029 keypunch into a key verifier. It is made by IDT and marketed by Wucu.

The three claim treble damages exceeding \$400 million in their suit filed in Federal District Court here.

The device developed by Data Research allows the 029 keypunch to be used as both a keypunch and key verifier. The new IBM 129 unit also combines both keypunch and key verifying into one unit.

The plaintiffs claim that IBM "acted to exclude (their device) from the market." In what is now becoming a standard reply to antitrust suits, IBM claimed that the suit is "entirely without merit."

International Data Terminals is 50% owned by Western Union Corp. and Wucu is 46% owned by Western Union Telegraph Co., a Western Union Corp. subsidiary. Data Research and Wucu each own 25% of International Data Research.

## Large Storage Unit Field Shows Activity

By E. Drake Lundell Jr.

CW Computer Industry Editor

PALO ALTO, Calif. — While most of the activity along this peninsula seems to revolve around the small, fast semiconductor memories there is also a great deal of activity at the other end of the scale — storage of large amounts of data.

The large storage units vary greatly from Precision Instruments' laser system for reading and writing information to the use of more conventional storage mediums such as microfilm and videotape.

### Trillion Bits

The Precision Instruments Unicon system is up and working after several years of discussion and demonstrations of prototypes and engineering models. The Unicon 609 stores a trillion bits on rhodium-coated polyester strips — with about 3 billion bit/strip. PI likes to point out that the system's trillion-bit capacity equals 10,000 reels of 800 bit/in. tape or 4,800 disk packs.

Cost per bit for the Unicon system is less than .0001 cents, according to marketing manager Don Bush. The system

offers an access time of a maximum of 8.6 sec to any bit in the trillion bit system or 97 msec within a single strip.

The most important news about the Unicon is that it is up and working — being demonstrated connected to an IBM 360/30 through the selector channel. The first unit is expected to go out the door this month or early next.

Presently the system is being shown to several large users with a good deal of interest coming from government agencies such as Nasa and the National Oceanic and Atmospheric Administra-

## On the Road

tion, as well as Social Security and the Veterans Administration.

As with most big systems, the largest problems developed with the software for the system so the first delivery was postponed by about six months. However, PI says that the bugs are now being overcome.

Storage of information in a pictorial form — on microfilm and videotape — is

also growing in importance, especially for applications such as law enforcement, where the storage of mug shots and fingerprints is needed.

Ampex is making a large entry into the law enforcement market with its Video-file through a contract with Los Angeles County Sheriff's Department, where it will automate the handling of more than 18 million law enforcement documents, among others.

While Ampex said that there was not much competition in this field, Morgan Information Systems down the street is trying to land some law enforcement business with its automatic microfilm terminal system, which can also be used to display fingerprints and mug shots as well as criminal histories.

The Morgan system allows updating of the microfilm records by using a two film system. If the record is found on the update 16 mm film, it will automatically be placed over the original 105 mm film record.

The large data base problem is not near solution, but the microfilm, videotape units and laser-systems offer some approaches.

## DTL, TTL Compatible

## CMI Offers Two 256-bit Rams

SUNNYVALE, Calif. — Two new 256-bit random access memories, the CM 1101 and CM11011, have been developed by Computer Microtechnology Inc. Organized 256 words by 1 bit, the DTL- and TTL-compatible MOS RAMs are fully decoded with on-chip sense and address decode and feature maximum access times of 1.5  $\mu$ sec (1101) and 1  $\mu$ sec (11011).

Typical power dissipation for both new memories is 1 mW/bit during access and 40 mW/bit on standby, the firm said.

Expansion to larger memories may be made through chip select input and wire "OR" capability of the outputs. The chip select input is provided to allow selection of an individual memory when the outputs are OR-tied in expanded memory applications.

Both the CM 1101 and CM11011 memories are packaged in hermetically sealed 16-pin dual in-line packages and specified over a temperature range of 0°C to +85°C. Volume prices for the new 256-bit RAMs are less than 5 cent/bit. Full military versions of the CM 1101 and CM 11011 memories are available with a temperature range of -55°C to +125°C from the firm at 611 Vaqueros.

## Mag Tape Transports For Minis Unveiled

NORTHBRIDGE, Calif. — Two new low-cost magnetic tape transports, Mod 309 and Mod 312, have been introduced by Unicomp, Inc. in a program to make available a wide range of tape transports for use with their minicomputers.

Mod 309 is a synchronous transport that operates at a speed of 75 in./sec. It is designed especially for use with Unicomp's Comp-16 and Comp-18, to be used in conjunction with Direct Memory Access. Mod 309

is available in 7- or 9-track IBM compatible. Data density is 1,600 bit/in.; phase-encoded, 800, 556, 200 bit/in. NRZI.

Mod 312 has a reel size of 8-1/2 in. and 1,200-ft capacity. Designed for use with the Unicomp Comp-16 and Comp-18, it is suited for keytape and ter-

## New OEM Products

minal applications as well. Mod 312 is available in 9 track, 800 bit/in. and 7 track, 800/556, 556/200 bit/in. and is IBM compatible. Electronics in both units are silicon solid state and 930 Series DTL logic, according to the company at 18219 Parthenia St.

## Displaytek Has Thermal Print Head

DALLAS — A thermal print head that features silent operation has been developed by Displaytek Corp. The DC-1157 also features drive circuits and printing elements integrated on a single silicon chip and can incorporate decode circuitry in the same package.

The unit has a silicon-integrated circuit with a five by seven matrix of dots formed by semiconductor elements. The dots can be heated in patterns to form any of the 96 standard Ascii code characters. The dots require only 4 to 10 msec to heat, and can achieve a print rate of up to 60 char/sec. The thermal print head has been qualified for use with paper commercially available from 3M Corp. and from NCR.

The print head operates from 16V, and each dot requires an average current of 100 mA. The silicon chip that contains the matrix, however, also includes

drive amplifiers for each dot so that only 1/2 mA of drive current is required, making the device compatible with MOS as well as with bipolar ICs, according to the firm.

Prices on the DC-1157 range from \$50 to \$65 apiece for annual quantities of 500 to 1,000 units to \$20 to \$30 apiece for annual quantities of 10,000 or more from the company at 4241 Sigma Road.

## Punched-Tape Reader Offered by Decitek

WORCESTER, Mass. — A dual-head, photo-optic punched-tape reader is now offered by the Decitek Division of Jamesbury Corp.

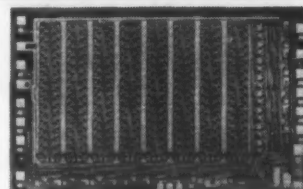
The unit features read-after-read to provide for verification of initial tape readout, using a reread head separated by one character (100 mils) from the initial read head.

In operation, original data is read by the unit and presented to whatever buffer a user may wish to use to hold readings until comparisons are verified on the next step from the reread position. Verification permits transmission of the original data, clearing of the buffer, and storage of new data. Any deviation in readings can cause the system to stop.

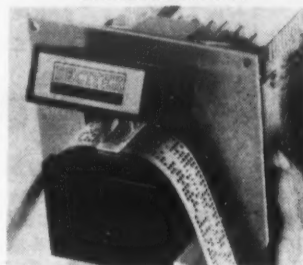
Tape is fed by a dual sprocket drive, and models are available for reading speeds of 60, 150, 300 and 600 char/sec.

## National Monolithic Keyboard Interface Debuts

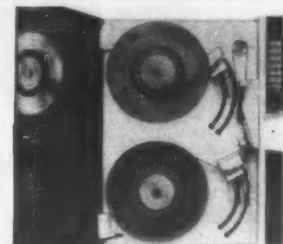
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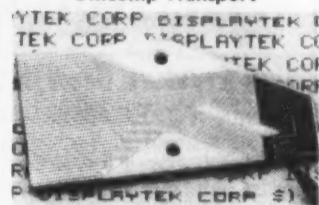
CMI 256-bit RAM



Decitek Reader



Unicomp Transport



Displaytek Head

MOS/LSI keyboard interface device that electronically scans and encodes the input from a keyboard has been developed by National Semiconductor. Called the MM4704/MM5704 Keyboard Interface, the device can scan 32 dynamic and eight static keys for simple switch closure and convert the key identity into a 9-bit code for system use.

Other circuitry included in the device provides programmable switch bounce said to eliminate false key closure decoding, a two-key "rollover" feature and an alarm signal for ambiguous key closures. Upper and lower case identity and busy control are also provided.

The MM4704/MM5704 is the first in a new series of digital subsystems that National Semiconductor is building for data terminals, business machines and other data processing systems.

One MM4704/MM5704 will handle all of the keyboard encoding and control functions necessary to control a 4 by 8

matrix of dynamic and eight static switches, and can be paralleled to encode large key matrices.

The keyboard switches that represent characters, symbols and other machine functions are encoded into 32 upper or lower case coded words by a 64-word programmable ROM. The ROM is programmed by the customer with standard or special codes up to nine bits long.

Clock rates are 10 kHz to .75 MHz. MOS power supplies, or +5V of -12V supplies may be used. The keyboard device interfaces readily with bipolar logic. Both the MM4704 (-55°C to +125°C) and MM5704 (0°C to 70°C) are packaged in a 24-pin dual in line package. Customer programming of character coding and switch bounce delay requires mask changes. A standard Ascii coded keyboard is available and designated the MM4704-AA/MM5704-AA. Unit price, in 100-up quantities, is \$25 for commercial version.

## Executive Corner

■ Irwin E. Kaplan has been appointed vice-president of Programming Methods, Inc. of New York, and will direct the activities of the Information Services Division.

■ Ronald J. Soltis has been named vice-president of business development for the Westinghouse Tele-Computer Systems Corp., Pittsburgh, Pa.

■ Burroughs Corp. has elected Manuel Garcia as vice-president and group executive of its Business Forms and Supplies Group. E. Geoffrey Wallace has been appointed to the new position of vice-president, administration on the corporate executive staff.

■ T. Paul Bothwell has been named a vice-president of Gould Inc. of Chicago.

■ Information Storage Systems, Inc., Cupertino, Calif., has appointed Robert Learned as vice-president, manufacturing operations.

■ Roy S. Mushrush was elected president, chief executive officer and director of Electronic Associates, Inc., W. Long

Branch, N.J.

■ Computer Micro-Image Systems, Chatsworth, Calif., has named J. Robert Kern as vice-president, marketing.

■ Mel Jacobs has joined Computer Merchandising, Inc., Arlington Heights, Ill., as executive vice-president.

■ Melvin L. Doelz has been promoted to vice-president and senior staff consultant at Control Data Corp.

■ Joseph F. Nash Jr., has been elected to vice-president, computer services of EDP Resources Inc., White Plains, N.Y.

■ Marketing Factors, Inc. of Minneapolis has appointed Michael E. Turner as vice-president, systems.

■ A. Peter Polus has been appointed president of Advanced Digital Systems, Inc., Mohawk, N.Y.

■ Victor A. Diels has been named vice-president and director of Proprietary Computer Systems Inc. of Los Angeles.

## Delco's Magic 341 Digital Computer Sixth in Series of Aerospace Machines

MILWAUKEE — A rugged, digital computer, the Magic 341, developed by General Motors' Delco Electronics Division here, was shown publicly for the first time at the American Institute of Aeronautics and Astronautics recent Space Shuttle Conference.

The Magic 341 is the sixth in Delco Electronics Magic III series of aerospace computers, under development by Delco for several applications since 1968. The M-341 incorporates refinements to other computers developed by Delco, such as for the Boeing 747's navigation system.

One version of the general-purpose M-341 is being used as a digital engine controller in Aerojet Liquid Rocket Co.'s proposed main propulsion system for Nasa's space shuttle vehicle. Delco Electronics has been teamed with Aerojet on the shuttle engine effort since February 1970.

In addition to the engine and control monitoring job for the shuttle, other applications of the M-341 include engine diagnosis, navigation and control, visual display, data selection and drive, fire control, general testing and process monitoring and control.

The basic Magic 341 consists of a digital bus card, a parallel-type central processor card, a core memory, several I/O modules

and a power supply. Several types of memories, including plated wire and solid state random access or read only, may be used either with or instead of the core memory.

The M-341 electronics may be purchased separately packaged or provided as a subassembly suitable for enclosure with additional electronics developed by the user. The electronics for a user-enclosed application might consist of the processor, 8,000-word core memory, interface modules, and power supply. These electronics would require only 272 cu in. and would weigh less than 10 lb.

The standard, random access memory is designed around a four-wire coincident-current, toroidal core array, with capacity expandable in blocks of 4,096 or 8,192 words to a maximum of 65,536 words. Words stored in memory have 17 bits, including memory parity.

Access time to the memory is 900 nsec. and cycle time is 3  $\mu$ sec. Maximum instruction execution rate varies with the type of memory employed — from 160,000 add operation/sec, with the high performance core memory, to 400,000 addition/sec, with the solid state memory.

Each I/O module is indepen-

dently and asynchronously addressable via a central data bus, thus permitting variable control of the sequence and the rate at which each I/O module is processed, the firm said. Methods of data transfer include direct memory access by input channels, program control by the processor, priority interrupt by input channels, and module instruction insert either by the processor or an input channel.

The Magic 341 contains a basic set of 21 instructions which allow more sophisticated instructions to be quickly executed through programmed subroutines. Double precision routines provide up to 31 bits of accuracy. Addressing is direct and relative with indirect transfers. "Instruction insert" techniques allow multiple nesting of priority interrupts. Basic compilers and assemblers facilitate software programming. Hardware diagnostics are available.

Other members of the Delco Electronics Magic III Series of computers include the Magic 301 (for Sram missile guidance), the Magic 311 (for the Carousel IV aircraft navigation system on the Boeing 747), the Magic 321, Magic 331, and the Magic 351/352 (for advanced area navigation systems, Titan III-C guidance and other space booster applications.)

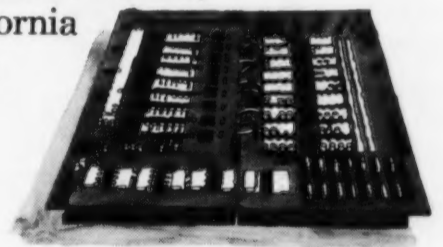
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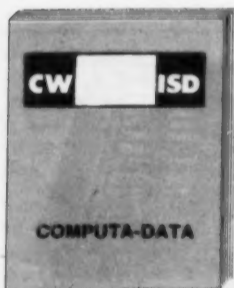
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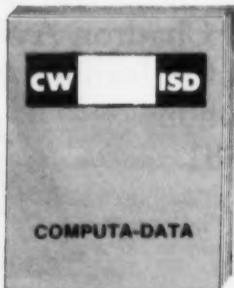


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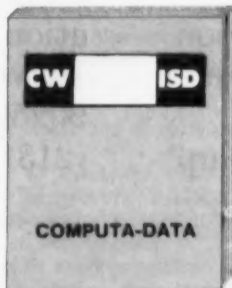
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# Commerce Sees '71 DP Shipments Rising 11% Over '70

By Alan Drattell

CW Washington Bureau

WASHINGTON, D.C. — A report on "U.S. Industrial Outlook" published by the Department of Commerce estimates that shipments of electronic computing systems by mainframe manufacturers will total \$4.2 billion in 1971 — an 11% increase over 1970.

By 1975 shipments will be \$7.3 billion, a growth of 14% a year. But for the last five years of the decade the annual growth rate will contract to 7%, reaching \$10.2 billion by 1980, according to Commerce. The annual rate of growth for the decade will be about 10.5%.

These figures are generally lower than industry-provided statistics. From Bureau of Census data, the Commerce figures do not include peripherals manufactured by mainframe companies and shipped separately or peripherals produced by the independents.

In other predictions for the decade, Commerce says that the peripherals industry itself faces many problems, and minicomputer manufacturers will have to scramble to survive.

The computer industry is one of more than 200 manufacturing and non-manufacturing industries covered in the annual edi-

tion of the "Outlook," prepared by Commerce's Bureau of Domestic Commerce.

The increase in shipments in 1971, according to the publication, "is predicated on the beginning of a turnaround in the computer industry as the new systems announced (within the past year) start to come off the assembly lines."

## Total Systems Concept

The decade, the report continues, "will be characterized by a trend toward the total systems concept." There will be a constant need for new capital as the industry progresses through the new equipment cycle, and there

will be strong demand for adequate marketing analysis and performance in order to maintain viable profit margins. "Those companies with only technological competence may well fail or be absorbed by the stronger, more broadly based companies."

The introduction of new computer lines by the mainframe manufacturers in the past year should stimulate peripheral sales in 1971, according to Commerce. IBM's recent price cuts, however, and price cutting by many independents to stay competitive does not augur well for the peripheral companies, Commerce said.

"One or two small product peripheral manufacturers," the report continues, "will have in-

creasing difficulty remaining viable in the future regardless of the present quality or demand for a product. Change in customer demand is so rapid because of competing products and new computer lines that equipment can become obsolete in a short time. This, in addition to a trend toward complete peripheral subsystems, will require future survivors to offer a fuller product line."

As for minicomputers, approximately 10% to 15% of these machines are tied into communications equipment, a proportion that Commerce says will grow to almost 75% by 1975.

Survival in this market will be worthwhile, however, with shipments expected to increase 15% to 25% per year into the mid-decade.

## Growing Sophistication and Independence Of End User May Give IBM New Pressure

By Phyllis Huggins

CW West Coast Bureau

WOODLAND HILLS, Calif. — "The most significant trend in the business in the last few years is the growing sophistication and independence of the end user," according to Erwin Tomash, chairman of the board and chief executive officer of Data Products, Inc. "As far as suppliers go," he said, "the main difference today is that we are all bruised."

Elaborating on the change in users, he says that all it used to take was an announcement of the "newest." Now users want to know reliability, longevity of the products, availability of spare parts, and they want tests on the equipment.

"We not only had naive customers before, we were naive suppliers." An indicator of this trend is that where it used to be only original equipment manufacturers who came through the plant and inspected manufacturing lines and control conditions, now the end user is making this inspection before buying.

This growing sophistication has resulted in putting new pressures on the total supplier, IBM. "They are really fighting now," said Tomash.

Graham Tyson, president and chief operating officer, said: "When IBM lowered its purchase price on large core by 45% we were in shock for a while. This was a well thought out attempt to knock out the competition. Rental prices weren't lowered but the reduction of purchase price opened it up for third party leasing who could then rent the equipment at lower cost to the user."

Data Products found, however, that the reduction hadn't hurt them at all, he said. "We offer a 2  $\mu$ sec memory while IBM has an 8  $\mu$ sec memory. Our system lowers the cost of the whole hardware system by speeding throughput," Tyson claimed.

Both Tomash and Tyson said they would like to be able to stop IBM price cutting but were emphasizing instead technological advantages that were particularly effective in specific ap-

plications areas.

As an independent supplier of printers, Data Products claims to be the largest. It also says it is number one as a card equipment supplier. In core memory it is about one-fifth of the largest supplier in the past year.

A major problem for peripheral equipment people is field maintenance. As Tyson put it, "you have to do a better job than the mainframe people."

Sales are restricted to areas where the firm has multiple installations so that the maintenance overhead can be covered. It is presently looking into, and has done some work with, third party maintenance firms which would open up sales to other than main industry centers.

In summing up the peripheral field, Tomash said, "It is evolutionary, not revolutionary. The present technology will hold firm for a few years. Manufacturing technology, cost control, this sort of thing is important, not revolutions. With the end user it is cost/performance; he couldn't care less what technology is used."

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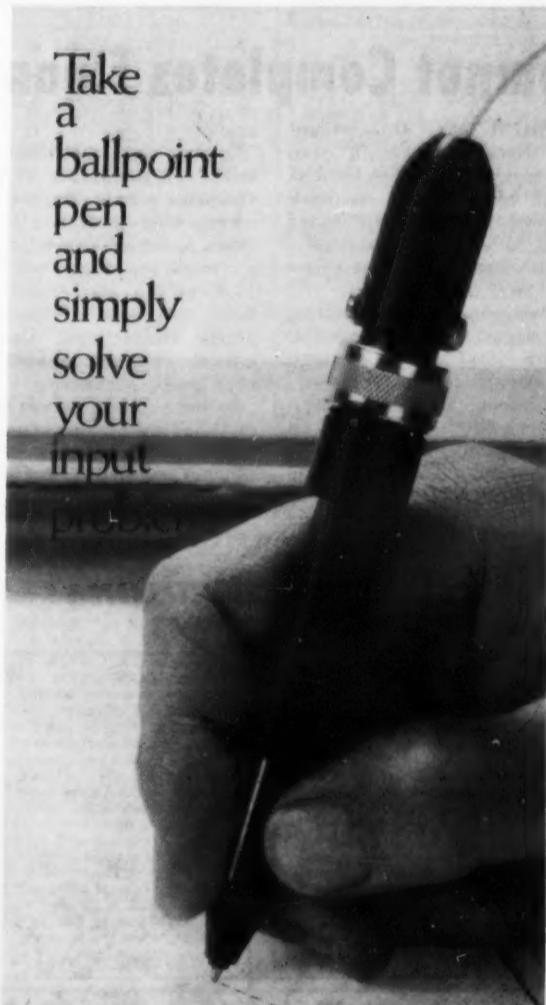
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# DEC Still Having Its Share of Problems

MAYNARD, Mass. — Things are looking gloomier and gloomier at Digital Equipment. In particular, the earnings for the third quarter, just ended, may come in at 15 cents a share while stock market analysts had been predicting twice that amount.

In the same period last year DEC made 43 cents a share.

Speaking to a group of security analysts, DEC Manager of Corporation Information, Mark Nigberg said that DEC is facing continuing difficulties selling, particularly in pushing the PDP-10, the firm's large, time-sharing system. Besides the poor order situation, Nigberg said DEC had been hurt by the British mail strike and a transportation strike in Sweden.

While Nigberg did not estimate fourth quarter earnings, he did say they would be considerably

below last year's 41 cents a share, and probably above the third quarter's earnings.

Wall Street analysts, acting on this information, have cut their

## Financial

estimate of DEC's 1971 earnings in half, from as high as \$2 to as low as 90 cents. Nigberg confirmed that 1971 estimates of 90 cents to \$1 were in order.

The spokesman said that incoming orders are still sluggish, but that there are some signs of a turn upwards in the economy reflected by increased orders from machine tool and instrumentation customers.

Some stock analysts have turned bearish on DEC, citing its price-earnings multiple in the

'60s and the continuing erosion of minicomputer prices. (One analyst figured out that mini mainframe prices have fallen about 22% a year over the past 10 years.) Others still praise DEC's long-term growth prospects, its dominance of a growing market and its technical expertise.

George Martin of Coleman & Co., a computer specialist, ques-

tioned the rate of growth of the mini market. While the market grew 44% a year from 1966 to 1970, Martin sees the growth levelling off at 15%.

The International Data Corp. recently forecast a 20% increase in the dollar value of shipments in 1971, and a 45% increase in the number of worldwide shipments. These figures are down from 25% and 83% last year.

## Keydata Shows 6-Month Net Profit of \$51,044

WATERTOWN, Mass. — Keydata Corp. has reported a net profit of \$51,044 for the first six months of the company's current fiscal year, ended Jan.

31, compared to a net loss of \$530,555 for the same period last year. Net operating revenues in the period increased 56% to \$2.8 million, from \$1.8 million the year before.

Net profit per share for the first half was equivalent to two cents compared with a loss of 37 cents per share for the same period a year ago.

Keydata President John T. Gilmore, Jr., in a letter to stockholders, called the progress made by the company in the first half of fiscal 1971 "heartening, when viewed in the light of the economic and business slump which has adversely affected the income and earnings of so many companies throughout the country during this period."

Gilmore said that the net profit of \$51,044 was attained despite the offsetting effects of three major factors. More than \$250,000 in capital expenditure was required to further develop the company's North American communications network. The profit was affected, to a somewhat lesser degree, by a sharp reduction in income resulting from renegotiated contracts with two of the company's licensees; this, however, is expected to increase the potential profits which Keydata anticipates from both of these long-term contracts.

And third, the prevailing economic slowdown caused a decline in the business activities of some of Keydata's subscribers, resulting in reduced service usage and a subsequent reduction in monthly revenues.

## Comnet Completes Financing With Banks

WASHINGTON, D.C. — Computer Network Corp., a computer services firm, has reached accord with two of its bank creditors, in which the banks agreed to a one-year extension of past due bank loans aggregating \$877,000.

In addition, certain directors and a large stockholder agreed to convert \$500,000 of matured notes payable to convertible preferred stock, subject, however, to stockholder's approval of an amendment of Comnet's Articles of Incorporation, approving the authorization of a preferred

stock.

Comnet last week also obtained an additional \$430,000 through a private placement.

Even after these two transactions, however, Comnet still has a negative net worth of \$1,250,000. Management believes that because of the foregoing transactions, Comnet's critical financial position has been greatly alleviated.

As the result of its acquisition of U.S. Time-Sharing's computer service business last December, Comnet reported earnings on operations for the months of Jan-

uary and February of \$22,000 and \$40,000 respectively, the first profitable months of operations in the past 19 months.

"Management attributed Comnet's increase in revenue and earnings to its decision last December to acquire the existing revenues of U.S. Time-Sharing," President Ralph R. Johnson said.

"We exchanged 500,000 restricted shares of our common stock for U.S. Time-Sharing's existing time-sharing business, and pledged an additional 100,000 shares if U.S. Time-Sharing met certain milestones relating to the orderly transfer of existing customers to our operations. These milestones have been met, and we have given U.S. Time-Sharing, Inc. a total of 600,000 shares of Comnet common stock making them our largest single stockholder," Johnson continued.

"While Comnet will show a substantial loss for the fiscal year ending March 31, 1971, I expect our fourth quarter now in progress to show a profit of approximately \$100,000."

The new financing has significantly solidified Comnet's current financial position and bodes well for a continuing increase in revenue and profit during the fiscal year

## New Registrations

TELEFILE COMPUTER CORP., 2000 Commonwealth Ave., Newton, Mass., a company principally engaged in the design, development and marketing of an on-line business computer system, DPE-411, has filed to register \$2.5 million of convertible subordinated debentures, due 1983, to be offered for public sale at 100% of principal amount. Proceeds intended for engineering, production, marketing of computer telecommunication products and computer file controllers. The balance will be added to working capital and used for general corporate purposes. The underwriter is S.D. Fuller & Co. Inc., 26 Broadway, New York, N.Y.

URBAN COMPUTER SYSTEMS, INC., 170 Concord Road, Chelmsford, Mass., a company engaged in the development of low cost, user-operated computer controlled data processing machines designed to be used by persons without special training, has filed to register 130,000 shares of common stock. Proceeds, at \$5 per share, intended to be used to purchase materials and components sufficient to manufacture 21 Model 70 systems; the balance will be added to working capital and used for general corporate purposes. The underwriter is Interstate Equity Corp., 44 Beaver St., New York, N.Y.

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## Acquisitions

Software Systems, Washington, D.C., has acquired the service bureau operations of Diversified Data Science and Service Inc. in Bethesda, Md., from Nytronics, Inc. The service bureau will continue operating in Bethesda as a branch of Software Systems' subsidiary, Reid & Thomas.

National Computer Services Corp., New York, has acquired DMS Computer Industries, Inc., Englewood Cliffs, N.J., a firm engaged in providing DP services to hospitals. Under the terms of the agreement, DMS Computer Industries stockholders will receive two shares of NCS stock for every NCS share outstanding.

Advance Data Corp., Philadelphia, Pa., and Motek Corp. have

agreed to merge. Under the terms of the agreement, which is subject to the approval of Advance Data Corp. stockholders, Motek stockholders will receive 1.5 million shares of common stock and 19,670 shares of preferred stock in conversion of all the outstanding common and preferred stock of Motek.

Pica Data Systems, Princeton, N.J., has been acquired by Geodatic for an undisclosed amount of stock. Pica Data provides management information systems and typographic information processing to the printing and publishing industries. Geodatic is a computer-based specialized marketing services company.

## Nickels and Dimes

The sad word from Fort Lauderdale is that Systems Engineering is forecasting a pretax loss of up to \$4.3 million and decreased revenues for the year ending June 30. The loss will come from at least \$2.5 million in inventory writedowns and an operating loss between \$1.4 million and \$1.8 million. Revenues will drop to \$12.5 million to \$14.5 million, off from last year's \$21.2 million. All this from C.E. Griffen, SEL's new president.

\$\$\$

The supplies segment of the computer market has perhaps been the least affected by the recession. But it has been affected. Ennis Business Forms, for example, has been forced to omit its next, quarterly, eight-cent dividend. The company blamed a "sharp decline" in profits, caused by the general economic condition and "pricing pressures." In the fiscal year ended Feb. 28 preliminary net income dropped to \$1.5 million, or 60 cents a share, from \$2.3 million or 97 cents a share, a year earlier.

\$\$\$

Burroughs President Ray MacDonald has predicted that his company's "rate of growth in revenue and earnings... [will] be somewhat moderated" in 1971. MacDonald cited a slower rate of incoming orders in 1970 as the reason. This year's plans include a slight reduction of inventory to improve inventory-to-revenue ratios. Capital expenditures will also be reduced, by a whopping 29% from 1970's \$255 million level.

\$\$\$

Four regional stock exchanges — Boston, Midwest, Pacific and Philadelphia-Baltimore-Washington — are discussing an electronic hookup that would in effect turn them into one large exchange, a competitor to the New York and American. While it's just discussion so far, the plans call for a common ticker, a common list of trading activity for newspaper publication, and a complex communication system.

\$\$\$

Digital Scientific in San Diego has resumed operations after finding new equity financing. The shop was closed from Feb. 26 to March 16 because of the money problem. Meta 4 users were supported during the suspension by DSC employees working without salary.

\$\$\$

Dotting the i's and crossing the t's: G.W. Woerner Jr.'s year-old suit against UCC and Ling-Temco-Vought has been dismissed. Woerner, who was ousted as president of Computer Technology when it was sold by LTV to UCC, sought \$87 million in damages, claiming that the defendants had "unjustly enriched themselves" at the expense of Computer Technology's minority shareholders.



# Computerworld Stock Trading Summary

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CLOSING PRICES THURSDAY, APRIL 1, 1971

X C H		1970-71 RANGE (1)	PRICE			
			1970-71 RANGE (1)	CLOSE APR 01 1971	2 WEEK NET CHNGE	2 WEEK PCT CHNGE
SOFTWARE & EDP SERVICES						
O	ADVANCED COMP TECH	1-10	2 1/4	-1/4	-10.0	
A	APPLIED DATA RES.	4-24	9 5/8	-1 1/4	-11.4	
O	APPLIED LOGIC	1-18	1 1/2	0	0.0	
O	ARIES	1-8	1 1/2	-3/8	-20.0	
N	AUTOMATIC DATA PROC	23-59	57 3/4	+1 7/8	+3.3	
O	AUTO SCIENCES	3-14	7 1/8	-1/2	-6.5	
O	BOOTHE DATA SYS	1-2	1 1/2	+3/8	+33.3	
O	BRANDON APPLIED SYS	1-10	5/8	+1/4	+66.6	
O	COMPUTER AGE INDUS.	1-3	3/4	0	0.0	
O	COMPUTER ENVIRON	1-15	1 3/8	-1/8	-8.3	
O	COMPUTER INDUS.	2-24	5	0	0.0	
O	COMPUTER NETWORK	2-14	6 3/4	-1/2	-6.8	
O	COMPUTER PROPERTY	4-15	7 1/2	+1/4	+3.4	
N	COMPUTER SCIENCES	6-34	12 1/4	-1/8	-1.0	
O	COMPUTER TASK GROUP	1-4	3/4	-1/4	-25.0	
O	COMPUTER USAGE	2-16	10	-1/8	-1.2	
O	COMP AUTOMOT REPORTS	3-11	7 3/8	-5/8	-7.8	
A	COMPUTING & SOFTWARE	16-75	44 1/8	+3 5/8	+8.9	
O	COMRESS	1-10	2 1/2	-3/8	-13.0	
O	COMSHARE	2-15	5 3/4	+3/4	+15.0	
O	CONSOL. ANAL. CENT.	1-4	1	-1/4	-20.0	
O	DATA AUTOMATION	1-24	2 5/8	+1/8	+5.0	
O	DATA PACKAGING	5-29	8 3/4	+3/4	+9.3	
O	DATAMATION SERVICE	1-6	1 1/2	0	0.0	
L	DATATAB	4-9	7 3/4	-1/2	-6.0	
O	DIGITEK	1-5	1 5/8	-1/4	-13.3	
O	EDP RESOURCES	5-13	11 3/4	+2 3/4	+30.5	
A	ELECT COMP PROG	3-11	6	+1/4	+4.3	
N	ELECTRONIC DATA SYS.	31-161	83 3/8	+4 1/8	+5.2	
O	INFORMATICS	4-21	10	+1 1/8	+12.6	
A	ITEL	6-28	19 1/4	-1 7/8	-8.8	
O	KEYDATA CORP	7-14	10 3/8	-1/2	-4.5	
A	MANAGEMENT DATA	7-25	8 1/4	-1 7/8	-18.5	
O	NATIONAL CSS INC	4-16	12 1/4	0	0.0	
O	NAT COMP ANALYSTS	1-8	3 3/4	+1 3/4	+87.5	
O	NAT.COMP. SERV.	2-12	2 3/8	-1/8	-5.0	
N	PLANNING RESEARCH	13-54	23 3/8	-1/8	-0.5	
O	PROGRAMMING METHODS	9-29	21 1/2	0	0.0	
O	PROGRAMMING & SYS	2-5	3 1/4	+5/8	+23.8	
L	PROGRAMMING SCIENCES	1-33	1/8	-1/4	-66.6	
O	SCIENTIFIC RESOURCES	1-22	1 3/8	0	0.0	
O	SOFTWARE SYSTEMS	1-3	1 1/4	-1/8	-9.0	
O	TBS COMPUTER CENTERS	4-27	4 5/8	-5/8	-11.9	
O	TOLLEY INTL CORP	1-13	5 1/4	+1	+23.5	
O	UNITED DATA CENTER	1-5	5 1/4	+1 1/4	+31.2	
N	UNIVERSITY COMPUTING	14-99	28 7/8	+1 3/4	+6.4	
A	URS SYSTEMS	5-21	8 3/4	-1 5/8	-15.6	
O	U.S. TIME SHARING	1-14	1 3/4	0	0.0	
PERIPHERALS & SUBSYSTEMS						
N	ADDRESSOGRAPH-MULT	20-62	35 1/4	0	0.0	
O	ALPHANUMERIC	2-15	4 7/8	0	0.0	
N	AMPEX CORP	13-48	23	+1	+4.5	
O	ASTRODATA	1-34	1 1/8	-1/8	-10.0	
O	ATLANTIC TECHNOLOGY	2-14	4 1/2	-1 1/8	-20.0	
A	BOLT, BERANEK & NEW	3-11	6 5/8	-1	-13.1	
N	BUNKER-RAMO	6-15	14	-1/4	-1.7	
A	CALCOMP	11-36	29 1/2	-1 1/4	-4.0	
O	COGNITRONICS	3-13	7 3/8	-1/4	-3.2	
O	COLORADO INSTRUMENTS	4-12	4 1/4	-1/4	-5.5	
O	COMPUTER COMMUN.	5-38	15	-1	-6.2	
A	COMPUTER EQUIPMENT	4-12	5 3/8	-1/2	-8.5	
A	COMPUTEST	12-28	19 1/2	+1 7/8	+10.6	
O	CONSOL COMPUTER LTD.	4-14	10 1/4	+1	+10.8	
A	DATA PRODUCTS CORP	5-26	8 1/4	-1	-10.8	
O	DATA TECHNOLOGY	2-23	6 1/2	+1/8	+1.9	
O	DIGITRONICS	3-13	4 3/4	-1 1/8	-19.1	
N	ELECTRONIC M & M	7-40	13 1/8	+1 1/8	+9.3	
O	FABRI-TEK	2-8	3 3/8	+1 1/8	+50.0	
O	FARRINGTON MFG	1-17	1 3/8	-1/8	-8.3	
O	FOTO-MEM INC	2-39	2 7/8	+7/8	+43.7	
O	INFOREX INC	16-42	42	+3 3/4	+9.8	
O	INFORMATION DISPLAYS	4-20	6 3/4	+1 5/8	+31.7	
O	MANAGEMENT ASSIST	1-4	7/8	-5/8	-41.6	
A	MARSHALL INDUSTRIES	14-67	20 1/8	-1 1/4	-5.8	
A	MILGO ELECTRONICS	15-42	18 5/8	-1/2	-2.6	
N	MOHAWK DATA SCI	19-87	35 3/4	+1/8	+0.3	
O	ON LINE SYSTEMS INC	6-23	14	+1	+7.6	
O	OPTICAL SCANNING	11-52	13	-1 5/8	-11.1	
O	PHOTON	4-17	10 1/4	+1 1/8	+12.3	
O	PHOTO-MAGNETIC SYS.	1-6	1	-1/8	-11.1	
A	POTTER INSTRUMENT	15-42	21 1/2	0	0.0	
O	PRECISION INST.	6-25	13	-1/4	-1.8	
O	RECOGNITION EQUIP	12-83	21 1/2	-1 1/2	-6.5	
O	REDCOR CORP.	4-34	7 3/8	-7/8	-10.6	
N	SANDERS ASSOCIATES	7-29	19 5/8	+1 1/8	+6.0	
O	SCAN DATA	5-53	7 1/2	+1/8	+1.6	
O	TALLY CORP.	10-23	13 1/2	-1 1/8	-7.6	
N	TELEX	10-25	19 1/2	-3/8	-1.8	
O	VIATRON	1-51	1 5/8	+1/8	+8.3	
SUPPLIES & ACCESSORIES						
N	ADAMS-MILLIS CORP	8-19	16 3/4	-1 5/8	-8.8	
O	BALTIMORE BUS FORMS	6-21	10	+1 1/4	+14.2	
A	BARRY WRIGHT	6-25	10 3/4	-2	-15.6	
A	DATA DOCUMENTS	15-35	24 5/8	-3 3/4	-13.2	
O	DUPLEX PRODUCTS INC	6-14	8 1/4	-3/8	-4.5	
N	ENNIS BUS. FORMS	9-19	10 1/2	-2 5/8	-20.0	
O	GRAHAM MAGNETICS	4-22	22 1/4	+1 1/8	+5.3	
O	GRAPHIC CONTROLS	5-17	8 5/8	-1/4	-2.8	
N	MEMOREX	46-166	74 1/8	-2	-2.6	
N	3M COMPANY	71-116	113 3/4	-1/2	-0.4	

X C H		PRICE			
		1970-71	CLOSE	2 WEEK	2 WEEK
		RANGE	APR 01	NET	PCT
		(1)	1971	CHNGE	CHNGE
O	MOORE BUS. FORMS	25- 41	41 1/8	+1 5/8	+4.1
N	NASHUA CORP	21- 43	40 1/8	+2 5/8	+7.0
O	REYNOLDS & REYNOLD	25- 49	48 3/4	+2	+4.2
O	STANDARD REGISTER	17- 30	21 3/4	-1	-4.3
O	TAB PRODUCTS CO	4- 13	12	- 1/2	-4.0
N	UARCO	22- 39	29	- 3/8	-1.2
A	WABASH MAGNETICS	7- 30	9	- 3/4	-7.6
N	WALLACE BUS FORMS	17- 41	22	-1	-4.3
COMPUTER SYSTEMS					
N	BURROUGHS CORP	78-173	118 3/4	-3 1/8	-2.5
N	COLLINS RADIO	9- 37	18 3/4	0	0.0
N	CONTROL DATA CORP	30-122	63 5/8	-1	-1.5
O	DATA GENERAL CORP	16- 59	34 3/8	+ 5/8	+1.8
N	DIGITAL EQUIPMENT	50-124	65 7/8	+2 3/8	+3.7
N	ELECTRONIC ASSOC.	3- 11	7	- 3/4	-9.6
A	ELECTRONIC ENGINEER.	3- 14	8 1/4	+ 1/4	+3.1
N	FOXBORO	18- 41	37	-1	-2.6
O	GENERAL AUTOMATION	9- 42	22 1/2	0	0.0
N	GENERAL ELECTRIC	60-112	112 1/4	+1 7/8	+1.6
N	HEWLETT-PACKARD CO	19- 45	38 5/8	-4 3/4	-10.9
N	HONEYWELL INC	65-152	108 3/4	-5 1/4	-4.6
N	IBM	223-387	356	-5	-1.3
O	INTERDATA INC	3- 22	9 3/8	+ 3/4	+8.6
N	NCR	30- 86	43 1/8	-2 1/8	-4.6
N	RCA	18- 36	35 3/8	- 7/8	-2.4
N	RAYTHEON CO	16- 40	39 5/8	+1 1/2	+1.2
O	SCI. CONTROL CORP.	1- 8	1 3/4	+ 1/4	+16.6
N	SPERRY RAND	19- 40	36 5/8	+1 7/8	+5.3
A	SYSTEMS ENG. LABS	10- 49	14 1/4	- 3/4	-5.0
N	VARIAN ASSOCIATES	9- 29	17 1/8	+1/4	+1.4
N	VICTOR COMPTOMETER	10- 31	24 3/4	-1 1/2	-5.7
N	WANG LABS.	18- 51	44 1/8	+2	+4.7
N	XEROX CORP	66-115	105 5/8	+ 3/8	+0.3
LEASING COMPANIES					
O	BOOTHE COMPUTER	8- 25	23 1/8	+4 1/8	+21.7
O	BRESNAHAN COMP.	2- 9	3 3/8	- 3/4	-18.1
O	COMPUTER EXCHANGE	2- 9	5 3/8	- 1/8	-2.2
A	COMPUTER INVSTRS GRP	4- 13	13 1/8	+ 5/8	+5.0
N	DATA PROC. F & G	6- 32	18 7/8	+1 1/2	+8.6
O	DATRONIC RENTAL	2- 8	3 1/8	+ 1/4	+8.6
A	DEARBORN-STORM	10- 35	32 3/8	-2 7/8	-8.1
O	DIEBOLD COMP. LEAS.	2- 11	9 3/4	-1	-9.3
A	DPA, INC.	3- 10	6 1/2	- 5/8	-8.7
A	GRANITE MGT	7- 22	10 1/4	- 3/4	-6.8
A	GREYHOUND COMPUTER	5- 44	9 3/4	-1	-9.3
N	LEASCO CORP	7- 30	20	- 3/4	-3.6
O	LECTRO MGT INC	1- 9	3 3/8	- 1/4	-6.8
A	LEVIN-TOWNSEND CMP	3- 19	7 1/2	+ 3/8	+5.2
O	LMC DATA, INC.	1- 4	1	+ 1/8	+14.2
O	NCC INDUSTRIES	3- 8	7 7/8	0	0.0
O	SYSTEMS CAPITAL	1- 8	3 5/8	- 3/8	-9.3
N	U.S. LEASING	3- 23	22 1/4	+1 1/2	+2.2

# The 2400 edits, rearranges, sorts, even computes— and then puts it all down on paper.



Mohawk Data's new SYSTEM 2400, configured for data printing, can give management the timely print-outs it needs. Without wasting expensive main frame time.

(Running printers off computers may seem fast, but it's terribly inefficient. The computer is degraded, because it must slow down to edit, reformat, and, of course, print.)

The SYSTEM 2400 lets you drive two printers simultaneously at whatever speeds you require. Your choice of 300, 450 line per minute chain printers, and a 1250 line per minute high speed printer. You can design the system to do exactly what you need done. It's modular.

If you're inputting the system with two tapes, they need not be alike in density or channel count. The System can perform concurrent I/O operations, and can be equipped with up to 32K bytes.

Three days. That's all it takes for anyone in the world to master MDL, the simple new language we devised to run the SYSTEM 2400. So you can save on programming costs, too.

Configure it yourself. Starting at \$600.

Truly, peripherals have come of age. Mohawk Data SYSTEM 2400.

Data-Satellite Configuration



Data-Editor Configuration



Data-Communicator Configuration



Data-Converter Configuration



Data-Sorter/Collator Configuration



Mohawk Data Sciences Corp.  
Herkimer, New York

